Volume 40 · Part 12 · December 1961

REVIEW OF APPLIED MYCOLOGY

COMPILED FROM WORLD LITERATURE ON
PLANT PATHOLOGY AND APPLIED MYCOLOGY

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PRINTED IN GREAT BRITAIN AT THE UNIVERSITY PRESS, OXFORD, BY VIVIAN RIDLER, PRINTER TO THE UNIVERSI

Rev. appl. Mycol., *Vol. 40, Part 12* *December 1961*

ROTHACKER (D.) & HAUSSDÖRFER (M.). **Eine Methode zur Prüfung von Wild- und Primitivkartoffeln auf ihr Verhalten gegenüber dem Kartoffelschorf, Streptomyces scabies (Thaxter) Waksman et Henrici.** [A method for testing wild and primitive Potatoes for their reaction to Potato scab, *S. scabies*.]—*Züchter*, **28**, 5, pp. 223–228, 3 fig., 2 graphs, 1958. [35 ref.]

The technique developed at the Inst. für Pflanzenzüchtung, Gross-Lüsewitz, Germany, enabled an easy inoculation of potato tubers at an early stage with a spore suspension [cf. **38**, 24]. The young seedlings were planted in containers of sterilized quartz sand so that their roots rested on the ground and their stalks passed through glass cylinders fixed in the sand to keep the plants upright. The containers were covered at the level of the upper edge of the cylinders to leave only the parts of the plants emerging from the cylinder exposed to light. Seedlings grown under short days (9½ hr. light), nutrient sol. being poured into the sand, developed the 1st tubers 13 days after planting when they were inoculated by a spore suspension sprayed into the cylinders and again 18 days later. Assessment 10 days later was on the effect of the disease on the plant, the size of the tubers, and the relative area of tuber covered by scab. Of 21 forms tested, including *Solanum tuberosum* subsp. *andigenum* (13), *S. simplicifolium* (1), *S. acaule* (1), *S. commersonii* (1), *S. chacoense* (1), *S. stoloniferum* (2), and *S. polyadenium* (2), none was resistant.

OLSEN (O. A.). **Potato wart investigations in Newfoundland.**—*Canad. Pl. Dis. Surv.*, **41**, 3, pp. 148–155, 1 map, 1961.

It is suggested in this review [cf. **37**, 369] from Canada Dept Agric., St. John's, that potato wart (*Synchytrium endobioticum*) was probably present in Newfoundland before 1909, the 1st official record. Since 1948, 111 named vars. (tabulated) and 300 numbered seedlings have been tested [**40**, 485]; Kennebec, Sebago, Ultimus, Urgenta, and F 5318 proved highly resistant. A survey from 1958–60 showed severity of infection to be correlated with rainfall.

WILLIS (C. B.) & LARSON (R. H.). **Crimson Clover, a new host for Potato virus X.**—*Amer. Potato J.*, **38**, 5, pp. 143–147, 2 fig., 1961.

This contribution from Dept Plant Path., Univ. Wis., Madison, has been noticed in a shorter form [**40**, 180]. The 2 strs of the virus inoculated to crimson clover were identified on *Gomphrena globosa* and *Nicotiana rustica*; a number of Leguminosae tested were not infected.

HABECK (D. H.), NIELSEN (L. W.), & BRETT (C. H.). **Attempts to control dissemination of internal cork virus of Sweet Potatoes with insecticides.**—*Plant Dis. Reptr*, **45**, 5, pp. 330–333, 1961.

Attempts at N. Carol. agric. Exp. Sta., Raleigh, over 4 yr. to reduce dissemination of internal cork virus [cf. **40**, 559] by means of insecticides in inoculated plantings were unsuccessful. The virus thus appears to be non-persistent.

URITANI (I.) & STAHMANN (M. A.). **Pectolytic enzymes of Ceratocystis fimbriata.**—*Phytopathology*, **51**, 5, pp. 277–285, 3 graphs, 1961. [29 ref.]

Further studies of sweet potato black rot at Univ. Wis., Madison [cf. **40**, 182], using methods described in considerable detail, showed *C. fimbriata* to produce 2 types of pectin depolymerase: A, which with cellulase was produced in infected tissue, decomposed polypectate more rapidly than pectin, and was most active at

pH 5·8; B, which decomposed pectin, but not polypectate, best at pH 8·1. The cellulase decomposed carboxymethyl cellulose. No pectin methyl esterase or exopectinase was detected. Sweet potato tissue contained an inhibitor of the depolymerases, apparently a protein.

Sun (S.-C.). **A preliminary report of studies on Thielavia basicola (pseudo-black scab) of Sweet Potato in the Kuanchong area.**—*Zhibing zhishi, 1958*, 2, pp. 111–113, 1 fig., 1958. [Chin.]

From the Dept Plant Protect., N.W. Inst. Agric., China, it is reported that *Thielavia basicola* [cf. **32**, 337] causes a widespread and relatively serious disease of sweet potato in the Kuanchong area, Shensi province, losses being considerable. The symptoms resemble those of 'black scab' [? *Ceratocystis fimbriata*: cf. **37**, 54]. Initial symptoms, not very pronounced, but developing quickly after a period in storage, take the form of black, rather depressed lesions penetrating ca. 1 mm. into the epidermis. Typical tuber symptoms are blackish-brown circular or near circular lesions, concave at the centre, unequal in size, 1–5 cm. (usually 1·5–3 cm.), coalescing at times to form a larger necrosis. Infection then gradually penetrates the interior, coloration becomes deep brown tinged with green, and chlamydospores appear on the surface. There may be as many as 10 lesions of different size on a badly infected tuber, the whole often turning black and becoming dry and wrinkled.

A close correlation was found between storage conditions and the development of *T. basicola*. Tuber viability gradually declines after exposure to low temp. and resistance to infection is diminished. The main factors in control are the maintenance of an adequate winter storage temp. and avoidance of exposure to low temp. throughout the period. Great differences were noted in varietal resistance.

Root disease control.—*R.R.I. Plant Bull.* 54, pp. 72–81, 4 fig., 2 diag., 1961.

This paper re-states the principles governing the control of rubber root disease caused by *Fomes lignosus*, *Ganoderma pseudoferreum*, and *F. noxius* [cf. **40**, 624], modifies the recommendations for Malaya made in 1958 [**37**, 507] in the light of more recent knowledge, and gives an account of methods of limiting spread in mature rubber. Cover plants and weeds should be kept away from the collars of young trees, any rubber stump left in the ground should be poisoned [cf. **39**, 190], and the cut surface creosoted.

Thomson (G. M.). **The diseases of Sugarcane in Natal.**—*Bull. Exp. Sta. S. Afr. Sug. Ass.* 9, 11 pp., 18 fig. (4 col.), 1958. [Received 1961.]

This general account of 15 diseases, based on lectures delivered to planters, describes the more important ones, comparative varietal reactions to them, and available means of control. Few of the diseases are serious and it is essential to prevent the introduction of virulent ones from neighbouring territories.

Thomson (G. M.). **Cane diseases.**—*Rep. Exp. Sta. S. Afr. Sug. Ass., 1959–60*, pp. 34–38, [? 1961].

At the Exp. Sta., Mount Edgecombe, Natal, incidence of sugarcane mosaic virus [**39**, 344] increased in the hitherto fairly resistant N:Co. 376, the usual effect being a severe stunting. Breakdown in resistance was partly due to the proximity of the susceptible but tolerant N:Co. 339, but a new str. of the virus may also be responsible. The salmon pink discoloration induced by sugarcane ratoon stunting virus [**40**, 245] near the growing points of very young shoots, not hitherto consistently observed in Natal in the field, was clearly visible in the greenhouse when water was withheld from diseased plants, especially the vars. N:Co. 334 and C.P. 36/105. Hot water treatment had a very adverse effect on germination of Co. 331, much less so of N:Co. 310. The results of disease yield trials [loc. cit.] are tabulated.

BIRD (J.). **Inoculation of Sugarcane plants with the mosaic virus using the airbrush.** —*J. Agric. Univ. P.R.*, **45**, 1, pp. 1–7, 1 col. fig., 1961. [Span. summ.]

At the Univ. agric. Exp. Sta. the airbrush method [**39**, 94] proved an easier and more efficient means of inoculation with sugarcane mosaic virus [**38**, 767; **40**, 323] than the standard Matz pin-thrust method. Procedure and results are described; sap from ground leaves [**40**, 559] was used.

BIRD (J.). **Further studies on transmission of the causal agent of the chlorotic-streak disease of Sugarcane.**—*J. Agric. Univ. P.R.*, **45**, 1, pp. 8–18, 1 col. pl. (4 fig.), 1961. [Span. summ. 18 ref.]

Further details are given of the transmission of sugarcane chlorotic streak virus disease [**39**, 39] at the Exp. Sta., Rio Piedras, when diseased and healthy plants were grown together in white quartz sand with ample moisture [**39**, 191], and when healthy plants were grown in soil taken from around and beneath severely affected plants in the field. The agent of chlorotic streak of Napier grass (*Pennisetum purpureum*) [cf. **35**, 548] was found to be the same entity as that of sugarcane. Healthy cane plants developed typical symptoms when grown with affected Napier grass plants in nutrient solution. Attempts to infect healthy cane plants mechanically via the roots with diseased root extract were unsuccessful.

PRAKASAM (P.) & VENKATA REDDY (T. C.). **Occurrence of a light race of Colletotrichum falcatum Went in Andhra Pradesh.**—*Sci. & Cult.*, **27**, 5, pp. 250–251, 1961.

At the Sugarcane Res. Sta., Anakapalle, A.P., a light form of [*Glomerella tucumanensis*] was obtained from var. Co. 421 in the Srikakulam district where incidence on this var. was very high at Bobbili taluk. Acervuli start forming [**40**, 487] in culture at 4 days old. They are dark stromatoid structures with setae, being later covered by pink spore masses. The 'Bobbili' light race was much more virulent than the dark and almost as pathogenic as C.f. 244.

SINGH (A.). **Manganese deficiency of Sugarcane.**—*Sci. & Cult.*, **27**, 2, pp. 102–103, 1 fig., 1961.

Symptoms resembling those of Mn deficiency (Pahala blight in Hawaii) [cf. **8**, 136; **15**, 606] were noticed on Co. 527 sugarcane growing at the Sugarcane Res. Sta. farm, Lucknow. The condition affected 4–86% of the plants in different rows. Progress was rapid, the chlorotic stripes rapidly turning white. Chemical tests confirmed diagnosis as Mn deficiency. Spraying the crop with a sol. of $MnSO_4$ (125 and 250 p.p.m. Mn) brought some improvement.

The nature and control of rosette and bushy top diseases.—*Leafl. Tob. Res. Bd, Rhod. Nyasald*, 1, 8 pp., 4 fig., 1960.

Two notes are presented by J. B. B. LEGGE, Senior Entomologist. The 1st, recommendations for control, suggests that after mid-Nov. seedbeds be drenched every 2 weeks with rogor 40 [methyl dimethyldithiophosphorylacetamide] 16 fl. oz./40 gal. water at 1 gal./5 sq. yd. A day or 2 before lifting beds should be sprayed with 32 fl. oz./40 gal. at 3 gal./bed. In the field sprays of 20 fl. oz./25 gal./acre should be applied weekly to all plantings from mid-Nov. onwards; earlier plantings need only 1 early-Jan. spray.

The 2nd contains notes on the nature and control of rosette [**40**, 8] (tobacco vein-distorting+tobacco mottle viruses), the mottle component of which is mechanically transmissible, but only aphid-transmissible in company with the other virus. Bushy top is probably a related form, as it is only aphid-transmissible in association with 1 of the 2 components of rosette. *Aphis maydis* is the main vector and mechanical transmission of little importance. As infection is most serious on young plants,

planting time is an important factor, mid-Oct. to mid-Nov. plantings being little affected.

HOLMES (F. O.). **Concomitant inheritance of resistance to several viral diseases of Tobacco.**—*Virology*, **13**, 4, pp. 409–413, 1 fig., 1961.

At the Rockefeller Inst., N.Y., a new tobacco line, recently selected and propagated because it bred true for greater resistance to tobacco mosaic virus than was available in parental lines, showed evidence of having inherited also the resistance of T.I. 245 [**40**, 324] to cucumber mosaic, turnip mosaic, potato mottle [virus X], tomato ring spot, and tobacco streak viruses. Inheritance of resistance to so many additional diseases in a line selected from a segregating F_2 population by the aid of tests involving only TMV supports the hypothesis that all the observed resistance is dependent on the same genetic mechanism.

SHALLA (T. A.). **Degradation of Tobacco mosaic virus by potassium permanganate.**—*Virology*, **13**, 3, pp. 383–386, 1 pl., 1961.

$KMnO_4$ has been used as a cytological fixative for electron microscopy. Preliminary studies at Dept Plant Path., Univ. Calif., Davis, showed that $KMnO_4$ degraded tobacco mosaic virus in Turkish tobacco leaves. This degradation was affected by temp., solute conc., and time of exposure.

WEINTRAUB (M.) & RAGETLI (H. W. J.). **Cell wall composition of leaves with a localized virus infection.**—*Phytopathology*, **51**, 4, pp. 215–219, 2 fig., 1961.

In further studies at the Res. Sta., Canada Dept Agric., Vancouver, B.C. [**40**, 92], cell walls within a radius of about 50 cells from tobacco mosaic virus lesions on *Nicotiana glutinosa* and tobacco (var. Connecticut Havana 423) contained predominantly Ca pectate in contrast to walls in healthy tissue, which contained primarily pectic acid interspersed with Ca pectate. Infected tissues are less rapidly disintegrated by pectinases than are healthy. Tissue surrounding old lesions on detached leaves contained soluble pectin. The staining reactions of cells in the lesions were negative for pectic and phenolic compounds and indicated some abnormality in the cellulose composition of the walls.

FOLLMANN (G.). **Hitzreaktivierung und Konzentrationsverhältnisse von Ringfleckenviren der Tabakgruppe.** [Heat reactivation and concentration relationships of ring spot viruses of the Tobacco group.]—*Phytopath. Z.*, **41**, 1, pp. 79–88, 7 fig., 1961. [Engl., Span. summ.]

At the Inst. für Virusserologie, Brunswick, Germany, 10 isolates of ring spot viruses from 9 hosts inoculated to 2 tobacco vars. could, after the apparent recovery to health of the test plants following heat treatment, be made to produce symptoms once more by raising the temp. to 35° C. for 10 days. Serological studies showed symptom development to be linearly related to virus content, but after heat reactivation virus conc. remained 10–20% below that of the initial value. Immediately after the heat treatment no new infections could be produced by abrasion or grafting with apical meristems, owing to partial inactivation of the virus. The results are discussed in regard to the process of recovery, the classification of the group, and the demonstration of the virus.

TODD (F. A.). **The occurrence of blue mold on Tobacco in West Germany, Switzerland, France and other European countries.**—*Plant Dis. Reptr*, **45**, 5, pp. 319–326, 3 fig., 1 graph, 1961.

A recapitulation of the spread and distribution of blue mould (*Peronospora tabacina*) in Europe [**40**, 490, 561, *et passim*], which has been estimated to have caused damage to the extent of $50,000,000. Disease counts in Germany gave estimated per-

centages of leaf area destroyed (50–100% in most fields of Burley); these and the acceptability of infected tobacco of different types to the trade are tabulated. Mild temps., high humidity, and overcast skies, common in Europe, are highly favourable for the disease. A vigorous control programme is suggested. The disease is reported in Poland and Romania.

ZANARDI (D.). **La 'muffa blu' del Tabacco. Storia, biologia, danni, e difesa.** [Blue mould of Tobacco. History, biology, losses caused by, and control.]

CIFERRI (R.). **Le incognite della 'muffa blu' o Peronospora del Tabacco.** [Unknown factors of 'blue mould' or *Peronospora* of Tobacco.]

CIFERRI (R.). **Scale per la valutazione in pieno campo della resistenza (o della suscettibilità) del Tabacco alla Peronospora.** [Scales for the assessment in the field of the resistance (or susceptibility) of Tobacco to *Peronospora*.]

RUI (D.), MORI (P.), & GIRALDI (G.). **Sperimentazioni antiperonosporiche su Tabacco in serra.** [Tests against *Peronospora* on Tobacco in a greenhouse.]

MARCELLI (E.). **La Peronospora del Tabacco (Peronospora tabacina Adam).** [*Peronospora* of Tobacco (*P. tabacina*).]

MARCELLI (E.) & ZANARDI (D.). **Risultati di prove di lotta antiperonosporica in colture di Tabacco in serra.** [Results of experiments on the control of *Peronospora* on Tobacco growing in a greenhouse.]—*Tabacco, Roma*, **65**, 698, pp. 3–19, 2 pl. (1 col.), 1 map, [29 ref.]; pp. 20–26; pp. 27–28; pp. 29–46, 1 pl. (6 fig.); pp. 47–93, 5 pl. (2 col.; 9+18 fig.), 2 graphs, [132 ref.]; pp. 94–106, 2 pl. (9 fig.), [15 ref.], 1961. [Engl. summs.] L. 500.

The whole of this no. is devoted to *P. tabacina*. The 1st paper has been noticed [**40**, 432]. The 2nd discusses the possibilities of control [see above] and factors affecting it, including the climatic conditions prevailing in Italy [**40**, 630]; it also deals with pathogenicity, and the development of resistant hybrids. The 3rd gives a simple scale for evaluating severity of infection, from 0·4% infected leaves (resistance virtually total) to 95–100% infected leaves (resistance virtually nil) [cf. **36**, 712]. Paper 4 gives the results of experiments in which the best control was given by non-Cu products; Cu salts were unsatisfactory. E. Marcelli adduces evidence indicating that there are 2 strs. of the fungus, one American, the other Australian, differing in pathogenicity to tobacco and other Solanaceae; the literature on control is fully discussed, with a concluding note on resistant vars. The last paper describes glasshouse spraying and dusting trials on naturally and artificially infected seedlings; zineb, ferbam, ziram, and maneb, both sprays or dusts, all gave satisfactory control. Benzole (8 l./100 sq. m.) had markedly curative and preventive effects. The no. concludes with a detailed report (pp. 107–150, 21 fig., 4 diag.) of various types of dusting machines and technical tests on their performance carried out under the direction of a committee.

BENETTI (MARIA P.) & LOVISOLO (O.). **Attacchi di Peronospora tabacina su alcune specie di Nicotiana coltivate in serra quali ospiti differenziali di virus.** [Attacks of *P. tabacina* on some *Nicotinia* spp. grown in a glasshouse as differential hosts of viruses.] — *Boll. Staz. Pat. veg. Roma*, Ser. 3, **18**, 1, pp. 9–17, 3 fig., 1960. [Engl. summ. 18 ref.]

The authors record *P. tabacina* [cf. above] on White Burley tobacco seedlings, *N. glutinosa*, and *N. rustica* in a greenhouse of the Plant Path. Sta., Rome, as well as on a few green suckers which had grown from a tobacco crop near the Station after picking. Some notes on the biology of the fungus are given.

Dukes (P. D.) & Apple (J. L.). **Influence of host passage on virulence of Phytophthora parasitica var. nicotianae.**—*Plant Dis. Reptr*, **45**, 5, pp. 362–365, 2 fig., 1961.

At Dept Plant Path., N. Carol. State Coll., Raleigh, 2 single-zoospore isolates of the fungus [**37**, 313] were passed serially through 8 susceptible (Bottom Special) and 8 resistant (Coker 139) tobacco plants, each series being inoculated directly from its predecessor after 2–3 and 4–8 weeks, respectively, without re-isolation. Re-isolates after the 4th and 8th passage were used for comparative pathogenicity tests. The virulence level of both isolates was significantly raised by the above procedure, though only isolate 1030 was more virulent after the 4th passage, and only through the susceptible and not the resistant var. These findings indicate the possibility of virulent biotypes arising in the field as a result of continuous tobacco culture (susceptible or resistant vars.) in infested soil.

Harrison (K. A.). **The control of late blight and gray mold in Tomatoes in Nova Scotia.**—*Canad. Pl. Dis. Surv.*, **41**, 3, pp. 175–178, 1961.

At Dept Agric. Res. Sta., Kentville, N.S., maneb and zineb were effective against *Phytophthora infestans* on tomatoes, but their use caused a marked increase of *Botrytis cinerea* [cf. **40**, 385], which was, however, controlled by adding 2 lb. thiram/100 gal. maneb or zineb spray. Other carbamate fungicides also enhanced the amount of grey mould.

Galli (F.) & Tokeshi (H.). **Ocorrência de Phoma destructiva Plowr. sôbre Tomateiro, Lycopersicum esculentum Mill.** [Occurrence of *P. destructiva* on Tomato.] —*Rev. Agric. Piracicaba*, **36**, 1, pp. 41–43, 1961. [Engl. summ.]

From the Escola Superior de Agricultura 'Luiz de Queiroz', Piracicaba, Brazil, *P. destructiva* is reported on tomato in various parts of São Paulo State. Disease symptoms on fruit and leaves and the fungus are described.

Strong (M. C.). **Rhizoctonia stem canker of Tomatoes.**—*Plant Dis. Reptr*, **45**, 5, pp. 392, 1961.

A stem canker of greenhouse tomatoes sent for diagnosis to Mich. State Univ., E. Lansing, in 1960 was similar to that reported for field tomatoes caused by *Rhizoctonia* [*Corticium*] *solani* [**29**, 388]. Inside the stems was the coarse brown mycelium of the fungus. The situation of all the cankers at the same stem height and their association with pruning lesions suggested basidiospore infection.

Termohlen (G. P.). **De fysiologische specialisatie van Cladosporium fulvum en het kweken van tegen de bladvlekkenziekte resistente tomaterassen.** [Physiologic specialisation of *C. fulvum* and the breeding for resistance in Tomatoes.]—*Tijdschr. PlZiekt.*, **66**, 6, pp. 314–327, 3 fig., 1960. [Engl. summ. 16 ref.]

At the Lab. voor Tuinbouwplantenteelt, Wageningen, and at the Proefsta. voor de Groenten- en Fruitteelt onder Glas, Naaldwijk, breeding of a suitable resistant tomato var. was carried out from 1949–55, English and Canadian resistant vars. not proving suitable locally. A selection of *Lycopersicum pimpinellifolium* [**40**, 188] was chosen as the resistant parent, subsequently shown to possess the resistance factors Cf_1 and Cf_3. A survey of *C. fulvum* races [cf. **34**, 111] and the resistant genes used is tabulated. The races 0, 1, 2, 3, 1.2, and 2.3 have been reported from England, Canada, and the Netherlands, whereas race 1.3 has not yet been found in the Netherlands and 1.2.3 only sporadically in Canada. Race 0 predominates in England and the Netherlands. To distinguish between the races, 3 vars., with the genes Cf_1, Cf_2, and Cf_3, are generally sufficient, but the effect of the resistant genes being to some extent dependent on environment, more test vars. should be used

with the same resistant gene. The opt. temp. for infection was 22–24° C. and opt. R.H. 80%. Diminution of light lessens resistance; lowering the humidity has the reverse effect. The correct reaction type in inoculation of leaf cuttings is obtained only on those with sufficient roots, suggesting a correlation with removal of assimilates. The incubation period of all races is 11–18 days, depending on environment, 3–5 days less for non-sporulating vitro-mutants.

Milinkó (I.) & Schmelzer (K.). **Zur Kenntnis der Mosaikkrankheit der Robinie (Robinia pseudo-acacia L.).** [On the mosaic disease of *R. pseudoacacia*.]—*Phytopath. Z.*, **41**, 1, pp. 36–41, 3 fig., 1 map, 1961. [Engl. summ.]

The disease, considerably reducing the growth of trees, was found in many places in Hungary, also in Bulgaria, Romania, and Czechoslovakia [**39**, 632], but in Germany only in the Botanical Garden, Berlin-Dahlem. It is probably a virus disease, identical with that described by Atanasoff [cf. **14**, 462], but different from the witches' broom disease found in N. America [loc. cit.]. Two very similar virus isolates from diseased trees were mechanically transmitted to herbaceous plants. For 1 of these isolates hosts in 7 plant families have been demonstrated.

Magnani (G.). **Una moria di piantine di Eucalitto da Pestalozzia.** [A die-back of Eucalyptus seedlings caused by *Pestalotia* sp.]—*Pubbl. Cent. Sper. agric.*, **4**, pp. 27–37, 1 pl., 1960. [Engl. summ.]

Potted *E. preissiana* seedlings in a heated glasshouse in Rome developed an infection leading to the production of necrotic zones on the leaves. The lesions were pale brown, darker near the edges. Affected tissues from the stem produced *P. versicolor* conidia [cf. **36**, 321]. In inoculation tests the fungus attacked only plants growing under unfavourable conditions.

Boyce (J. S.). **Symptoms in relation to infection pattern in white Oak.**—*Plant Dis. Reptr*, **45**, 5, pp. 386–387, 1961.

Observations at the Southeastern For. Exp. Sta., Asheville, N. Carol., showed branch dieback and water-soaked leaves to be good field symptoms of wilt (*Ceratocystis fagacearum*) [**40**, 437] in white oak (*Quercus alba*), and that the fungus was not uniformly distributed in some trees, making cultural confirmation of infection even more difficult than with red oak.

True (R. P.), Barnett (H. L.), Dorsey (C. K.), & Leach (J. G.). **Oak wilt in West Virginia.**—*Bull. W. Va agric. Exp. Sta.* 448T, 119 pp., 48 fig. (1 col.), 1 diag., 8 graphs, 1 map, 1960. [200 ref.]

True (R. P.) & Gillespie (W. H.). **Oak wilt and its control in West Virginia.**—*Circ. W. Va agric. Exp. Sta.* 112, 18 pp., 12 fig., 2 maps, 1961.

Losses from *Ceratocystis fagacearum* [**40**, 566 and above] in W. Va are not very great at present, but the disease is regarded as a potential threat to an industry worth $20,000,000 annually. In Bull. 448T (of which the Circ. is a shortened version) the history, distribution, symptoms, etiology, and transmission of oak wilt are reviewed and methods of control are described, including 3–5 aerial surveys each summer, and the deep-girdling of affected trees.

Torres (J. J.). **Nueva enfermedad del Chopo en España.** [A new disease of Poplar in Spain.]—*Bol. Serv. Plagas For.*, **3**, 5, pp. 11–14, 1960. [*For. Abstr.*, **22**, 2, p. 270, 1961.]

Dothichiza populea [map 344], reported in Spain only once before (in Lérida, in 1924), was found causing serious damage in Guadalajara, where it appears to have found opt. climatic conditions during the 1959–60 winter.

Narasimhan (M. J.) & Thirumalachar (M. J.). **Ravenelia esculenta an edible rust fungus.**—*Phytopath. Z.*, **41**, 1, pp. 97–102, 9 fig., 1961. [Germ. summ.]

This rust, which incites considerable malformation of the shoots and inflorescences of *Acacia eburnea*, was 1st described by Barclay as *Aecidium esculentum* in 1890 from Poona, India. All the infected parts are collected and eaten by the local people. The rust has a perennial dormant mycelium which produces vigorous growth soon after the monsoon rains in July–Aug. The axillary buds on the shoots become hypertrophied and elongated and turn orange-yellow, owing to the numerous pycnia, which are subcuticular, minute, without conspicuous ostiolar paraphyses, and 100–130 μ diam. The aecia are cupulate, deep-seated, and covered with a tough dome-shaped peridium. The aecidiospores are ovoid-ellipsoid to cuboid, pale yellowish brown, slightly thickened at 1 end, densely verruculose, with 2 germ pores, 30–40 × 16–22 μ, and germinate readily in water. Those from unopened aecia remain viable even after 4 months at room temp.

Leaflets of inoculated seedlings developed minute infection spots after 10 days and many uredial pustules after 15 days. The uredia and telia, which are formed on inconspicuous leaf spots, are easily overlooked in the field owing to the small size of the pinnules. Uredia are subcuticular, amphigenous, minutely paraphysate, the paraphyses being intermixed. The uredospores are golden-brown, ovoid-ellipsoid, minutely verrucose, with 2–3 equatorial germ pores, and 18–25 × 15–18 μ. The telia are formed in old uredia later in the season, mainly from Jan.–Feb. onwards. The spores are brownish black and intermixed with uredospores, pedicellate, the heads being composed mostly of 4–8 spores. The pedicels are compound, composed of 2–3 hyphae, fragile, and up to 15 μ long. There are 4–6 cysts subtending the head and mature spores are unicellular, yellowish brown, smooth, without any appendages, and 20–25 × 18–20 μ. When mature they germinate readily in water, developing a 4-celled promycelium bearing globular sporidia, 7–10 μ diam. These sporidia infected *A. eburnea* seedlings. After 10–12 days the young plumule showed hypertrophy and characteristic infection symptoms.

The authors describe the fungus as a new sp., *R. esculenta* Narasimhan & Thirum. syn. *Aecidium esculentum*.

Forest pathology.—*Rep. For. Inst. Oxf.*, **36** (*1959–1960*), pp. 15–17, 1960.

This report [cf. **39**, 633] describes the re-examination of Douglas fir [*Pseudotsuga menziesii*] affected by bark necrosis in the Forest of Dean and Dymock Forest; injury to the phloem is important in the development of the necrosis, and the inland 'Fraser River' types of fir are more susceptible than the coastal types. Die-back of Corsican pine [*Pinus nigra* var. *calabrica*] was shown to be due initially to physical, and not biotic, factors; death usually took place between the onset of spring growth and midsummer. *Pythium* spp. [cf. **39**, 746] were associated with the dieback of tree root systems, particularly on heavy, water-logged soils; 3 *P.* isolates from Douglas fir, Sitka spruce, and Corsican pine were inoculated to these trees in soil water cultures and re-isolated from the infected roots.

Gremmen (J.). **De schorsbrand van de Japanse Lariks, veroorzaakt door Phacidiella coniferarum.** [A dieback of Japanese Larch caused by *P. coniferarum*.]—*Tijdschr. PlZiekt.*, **67**, 2, pp. 52–56, 2 pl., 1961. [Engl. summ.]

The author (Bosbouwproefstation 'De Dorschkamp', Wageningen) discusses the nomenclature of the fungus, the imperfect state of which he considers should be named *Phacidiopycnis pseudotsugae* [**36**, 625]. Hosts in the Netherlands [**38**, 491] include *Pseudotsuga taxifolia* [*P. menziesii*] and Japanese larch; on the latter a high percentage of inoculations were successful when trees were wounded in the dormant period, whereas during growth the fungus is checked by host activity. Brashing

should be done during the growing season and care taken in winter to avoid infectable injuries.

LYR (H.). **Die Wirkungsweise toxischer Kernholz-Inhaltsstoffe (Thujaplicine und Pinosylvine) auf den Stoffwechsel von Mikroorganismen.** [The effect of heartwood toxins (thujaplicin and pinosylvin) on the metabolism of microorganisms.]—*Flora*, **150**, 2–3, pp. 227–242, 1 fig., 3 graphs, 1961. [Engl. summ.]

In studies at the Inst. für Forstbotanik, Eberswalde, E. Germany, with several toxins from the heartwood of conifers (β- and γ-thujaplicin [cf. **37**, 606], 7-hydroxy-iso-propyl-tropolone, and pinosylvin-monomethylether) the O_2 consumption of isolated mitochondria of *Phellinus* [*Fomes*] *igniarius* and *Collybia velutipes* was accelerated by concs. 10^{-6} M, whereas higher concs. inhibited respiration. It is concluded that the toxins are typical uncoupling poisons which at low concs. cause a specific inhibition of oxidative phosphorylation in the same way as do dinitro- and pentachlorophenol [**39**, 279].

SATO (K.), OTA (N.), & SHOJI (T.). **Investigation of Rosellinia herpotrichoides Hepting et Davidson as the cause of the snow blight on Yezo Spruce seedlings. I. II.**—*J. Jap. For. Soc.*, **41**, 2, pp. 64–71; 5, pp. 167–174, 1959. [Jap. 17 ref. *For. Abstr.*, **22**, 2, p. 266, 1961.]

In 11 yrs.' work on snow mould of conifers [**40**, 439] the authors have not found *R. herpotrichoides* [cf. **35**, 854], though it was identified as the pathogen of *Picea jezoensis* in 1939 and 1940. The chief pathogen of this host and of *Abies sachalinensis* was determined, however, as *Rhizoctonia* sp. Comparison of the 2 fungi revealed marked differences in the colour and fructification of the mycelial mats, and in hyphal and spore development on different artificial media. Fungi isolated from Japanese conifer spp. affected by snow blight are listed.

The 2nd paper reports further differences between *Rosellinia herpotrichoides* and *Rhizoctonia* sp. in mycelial growth at different temps. and pH values. In inoculation tests under snow only the latter fungus caused blight on conifers, from which it is concluded that *R. herpotrichoides* is not a cause of snow blight.

MURRAY (J. S.) & YOUNG (C. W. T.). **Group dying of Conifers.**—*For. Rec.* 46, 19 pp., 9 fig., 3 maps, 1961.

This review from the Forestry Commission, of information concerning *Rhizina inflata* [cf. **40**, 189, 495, *et passim*] (the name *R. undulata* appears to have priority), deals with the history and distribution of group dying in Great Britain and the development of groups; the association of the fungus with fires in various areas; the relation of *R.* infection to windblow, exposure, and the presence of other parasites; and the seasonal timing of fires in relation to incidence and other factors influencing establishment of the fungus. Prohibition of all fires in or near conifer plantations is recommended.

CHILDS (T. W.). **Laminated root rot of Douglas Fir.**—*For. Pest Leafl. U.S. Dep. Agric.* 48, 6 pp., 4 fig., 1960.

This publ. from Pacific N.W. For. Range Exp. Sta., Portland, Ore., describes the disease, caused by *Poria weirii* [on *Pseudotsuga menziesii*: cf. **40**, 636], symptoms, spread, damage caused, and control.

ZILLER (W. G.). **Pine twist rust (Melampsora pinitorqua) in North America.**—*Plant Dis. Reptr*, **45**, 5, pp. 327–329, 1961. [15 ref.]

The susceptibility of *Pinus ponderosa* to *M. pinitorqua* [*M. populnea*: **37**, 561; **39**, 189] and the 1st recorded occurrence of this rust in N. America, in a nursery in B.C., are reported from the For. Entomol. and Path. Lab., Victoria, B.C., Canada, with some notes on the disease as it is known elsewhere.

GUNDERSEN (K.). **Growth of Fomes annosus under reduced oxygen pressure and the effect of carbon dioxide.**—*Nature, Lond.*, **190**, 4776, p. 649, 1961.

Studies at Univ. Gothenburg [Göteborg, Sweden] on 9 *F. annosus* strs. from the fruiting bodies of infected Scots pine and spruce indicated that this fungus is able to grow equally well under aerobic and microaerophilic, but not under anaerobic conditions, and that a slight rise of CO_2 pressure stimulates mycelial growth, though a high conc. inhibits it.

DRIVER (C. H.) & DELL (T. R.). **Fomes annosus root-rot in slash Pine plantations of the Eastern Gulf Coast States. Observations on Fomes annosus root-rot in natural stands of loblolly and shortleaf Pine.**—*Plant Dis. Reptr*, **45**, 1, pp. 38–40, 1 map, 1 fig.; 5, pp. 352–353, 5 fig., 1961.

A survey during Oct. 1960 showed this rot [**40**, 486] to be prevalent to various degrees in thinned slash pine (*Pinus elliottii*) plantations of the Ga, Fla, Ala, and Miss. coastal plain.

It also caused deaths in natural mixed stands of loblolly (*P. taeda*) and shortleaf pine (*P. echinata*) in Decatur County, Ga, where sporophores also appeared on 2 spp. of hardwood understory saplings, southern red oak (*Quercus falcata*), and shining sumac (*Rhus copallina*), new host records for Ga.

MAY (LUIZA C.). **Damping-off de Pinus montezumae.** [Damping-off of *P. montezumae.*]—*Rev. Agric. Piracicaba*, **36**, 1, pp. 13–14, 1961.

In the greenhouse of the Secção de Introdução, Serviço Florestal, São Paulo, hyphae and sclerotia of *Corticium solani* were isolated from diseased pine seedlings. Control was obtained by soil sterilization with 1 : 50 formaldehyde, applied 5–6 days before sowing, or by seed treatment with semesan.

BANERJEE (S.) & NAHA (P. M.). **Trametes cingulata Berk. causing decay of Sal (Shorea robusta Gaertn. f.) timber.**—*Phyton, Vicente López*, **14**, 2, pp. 93–109, 3 pl., 1960.

On freshly cut logs and posts from local timber-yards examined at Univ. Calcutta fructifications of *T. cingulata* [**32**, 118; **40**, 440] were bursting through cracks or growing on exposed surfaces. Mycelium was found only in the sapwood, and this was confirmed by decay-resistance tests. At a moisture content of the sapwood above fibre-saturation point the fungus caused considerable damage, with an av. loss in dry wt. of 18·9% in only 4 months.

All the wood elements of the logs were attacked; the hyphae were both inter- and intracellular, making bore-holes by chemical dissolution of the cell-walls and forming masses inside the lumen. During decay, cellulosic materials and lignin in the primary and secondary walls were gradually digested.

On malt agar $ZnCl_2$ inhibited mycelial growth completely at 0·09% and ascu A at 0·07%.

HARTLEY (C.), DAVIDSON (R. W.), & CRANDALL (B. S.). **Wetwood, bacteria, and increased pH in trees.** –*Rep. For. Prod. Lab., Madison*, 2215, 34+2 unnumbered pp., 3 fig., 1961. [106 ref.]

The subjects dealt with are previous work on water-soaked wood, the detection of 'wetwood' [cf. **14**, 803], spp. affected, micro-organisms and symptoms associated with the condition, durability, and other properties, and causal relations. Knowledge of the differences between sapwood and heartwood and of the transition from one to the other is still incomplete. Elms, willows (*Salix* spp.), and poplars often have interior wood which is wetter than the adjacent sapwood. The wet zone is usually less acid than the sapwood and in some spp. distinctly alkaline. This is the

wood generally termed 'wetwood'. In the spp. in which the condition has been most studied in the past bacteria [cf. **39**, 254] were the organisms most commonly isolated from affected parts and the information at present available appears to support the view that most of the properties peculiar to 'wetwood' are due to saprophytic or weakly parasitic bacteria present in the standing tree [cf. **14**, 409; **32**, 523, *et passim*]. So many kinds of trees, organisms, and effects are involved, however, that information concerning the condition may still be regarded as only fragmentary. The authors have attempted to bring together all the available evidence and information, published and unpublished, and they make a number of suggestions for further study.

Packman (D. F.). **The acidity of wood.**—*Holzforschung*, **14**, 6, pp. 178–183, 2 graphs, 1960. [Germ. summ. 12 ref.]

At the For. Prod. Lab., Princes Risborough, England, the acidity and dampness of wood [cf. above] of several spp. was shown to increase with rises in temp. to 100° C. By an apparent ability to decompose or neutralize acid, certain fungi inhibited acid accumulation at temps. within their own ranges of growth. Isolates from sawdust included *Aspergillus fumigatus*, *Monatospora lanuginosa*, *Thermoascus* sp., and *Paecilomyces variotii*.

Fuller (R. G.). **Evaluation of two bisphenols as wood-preservative agents.**—*For. Prod. J.*, **11**, 4, pp. 193–196, 1961.

In studies at the Battelle Memorial Inst., Columbus, Ohio, from 1951–60, both G-4 [**37**, 644] and 2,2¹-thiobis(4-chlorophenol), or compound 30, contributed to the effectiveness of creosote, Cu naphthenate, and creosote-coal tar when used in mixtures to preserve southern yellow pine [*Pinus* spp.] soil stakes against wood-destroying fungi and marine panels against marine organisms. The panels were evaluated for resistance by exposure in salt water at the Battelle N. Florida Res. Sta., Daytona Beech, Fla. Three treatments proved to be definitely superior, as judged by the number of completely sound specimens and average decay and termite grades. These were: 2·5% of either compound in creosote + No. 6 fuel oil and 2·5% G-4 + 1% Cu as Cu naphthenate in 4 A fuel oil. It is concluded that these bisphenols deserve further consideration as adjuvants or co-toxicants with the 3 wood-preservatives.

Reynolds (Gail) & Burch (J. E.). **Biological significance of ODPN-insoluble and glycol-insoluble tests.** *For. Prod. J.*, **11**, 4, pp. 201–202, 1 graph, 1961.

In further bioassay tests at the Bell Telephone Labs, Inc., Murray Hill, N.J., in which soil-blocks treated with various ranges of the selective solvent ODPN [**34**, 269] and creosotes, creosote-petroleum blends, and petroleums (characterization data determined at the Battelle Memorial Inst., Columbus, Ohio) were exposed to attack by *Lentinus lepideus* (Madison 534), the evidence obtained indicated that a rapid method for determining the relative initial preservative potential of creosote and creosote-petroleum mixtures may be available. ODPN-insoluble test values are related to the expected unweathered block thresholds that might be obtained by soil-block bioassay, the same relationship holding for glycol-insoluble values, which parallel the ODPN data, and are more valuable now that ODPN is unobtainable commercially. A glycol-insoluble index of 53 or under corresponds generally to a satisfactory whole creosote. Petroleum with glycol-insoluble indices over 86 generally have high thresholds and unsatisfactory preservative powers. A creosote or a blend of questionable preservative potential would be in a transitional zone of 54–85, which suggests questionable field performance.

Zubieta (G. J.) & Gómez (C. E.). **Preservados compuestos solubles en agua II. Valoración tóxica comparativo.** [Water-soluble preservative compounds II. Comparative toxic evaluation.]—*Industr. y Quím.*, **20**, 2, pp. 135–140, 1960. [30 ref.]

This further report from the Dirección General de Técnica de la Secretaría de Comunicaciones, Buenos Aires, Argentina [**36**, 440], is concerned with the effects of 4 preservatives of the Wolman salts type, viz. cobra D.F.A., tancas U.A., weylan U.A., and salebu, and 1 fluosilicate, M.A., on 3 fungi isolated from telegraph poles, namely, an unidentified polypore (L.C.T. 20) and a basidiomycete (L.C.T. 82) from *Astronium balansae* and *Coniophora puteana* (L.C.T. 37) from *Phyllostylon rhamnoides*.

In trials with L.C.T. 20 retention was higher and the wt. loss lower in samples treated with salebu than with tancas, the principal differences between which lay in the presence in salebu of 17·2% $Na_2B_4O_7$. 10 H_2O and in tancas of 7·5% $C_6H_3OH(NO_2)_2$. The other 2 fungi were tested with all the preservatives. Cobra D.F.A. reduced the virulence of *C. puteana* even at 1 kg./cu. m., while weylan was similarly effective at 3 kg. L.C.T. 82 was highly tolerant of all 5 chemicals.

Seaman (W. L.). **Variability in pathogenicity among isolates of Plasmodiophora brassicae.**—*Diss. Abstr.*, **21**, 6, p. 1326, 1960.

The occasional occurrence of clubbing in the clubroot resistant cabbage Badger Shipper in field and greenhouse trials at Univ. Wis. was found to be associated with the build-up in naturally infested soils of a variant of *P. brassicae* [**37**, 384] highly virulent in this var. Badger Shipper plants were highly resistant to the predominant form of *P. brassicae* in Wis. soils [**40**, 443]; exposure of seedlings to high concs. of inoculum from severely affected Wisconsin All Seasons plants in the greenhouse resulted in a type of restricted nodular clubbing not usually found in roots of susceptible cabbage vars. There was severe clubbing in Badger Shipper roots exposed to an isolate from infected plants of this var. The build-up of this variant in field soils was associated with the repeated exposure of Badger Shipper in a screening programme for clubroot resistance. Bindsachsener plants selected for clubroot resistance in Germany were similar to those of Badger Shipper in resistance to the predominant variants of *P. brassicae* on susceptible cabbage vars. in Wis., but also showed a marked resistance to the variant virulent in Badger Shipper. The isolates in Wis. soils were pathogenic to *Barbarea vulgaris* but not to Laurentian rutabaga (*Brassica napobrassica*). It is proposed that the Wis. isolate pathogenic to Badger Shipper be designated race 7. In preliminary trials Michihli Chinese cabbage (*B. chinensis*) and Jersey Queen and Wisconsin All Seasons cabbages were apparently immune from a Calif. isolate to which *B. juncea* and *Lobularia maritima* were susceptible. However, on repeated exposure of Michihli a variant similar to race 7 appeared which was pathogenic to Michihli, Wisconsin All Seasons, and Badger Shipper.

Ciocan (C.) & Calnegru (I.). **Le Rhizoctonia solani Kühn, parasite sur Chou-fleur en Roumanie.** [*Corticium solani*, parasitic on Cauliflower in Romania.]—*Rev. Mycol., Paris*, **26**, 1, pp. 40–41, 1961.

In Apr. 1950 *C. solani* was isolated from 123 of 127 diseased cauliflower plants [cf. **34**, 565] (cultivar Erfurter Zwerg Früher) in a field of 3,560 plants, of which 1,964 were diseased, near Bucarest. Inoculations in the field and greenhouse of healthy cauliflower plants of the same cv., Dittmark cabbage, Aurore tomatoes, and Odesse 1 cotton caused infection.

Nixon (H. L.) & Gibbs (A. J.). **Electron microscope observations on the structure of Turnip yellow mosaic virus.**—*J. mol. Biol.*, **2**, pp. 197–200, 1 pl. (6 fig.), 1960.

Electron micrographs prepared at Rothamsted exp. Sta. by a negative staining technique [cf. **39**, 398] showed the internal structure of the virus, which agreed with that inferred from X-ray data.

Harrison (E. M.). **Some chemical aspects of resistance to Cercospora leaf-spot in Sugar Beets.**—*Diss. Abstr.*, **21**, 6, p. 1357, 1960.

At Colo. State Univ. a dihydroxyphenol containing 1 or more side groups having no conjugation with the benzenoid structure was found to be more concentrated in leaves of sugar beet plants resistant to *C. beticola* [**35**, 805] than in susceptible ones. Although non-toxic it could be oxidized by chemical agents or by the polyphenolase isolated from the leaves to a substance extremely toxic to the fungus in culture. It is postulated that injury, such as the entrance of *C. beticola*, allows the polyphenolase enzyme to act on the phenolic compound with the production of toxic substances and stimulates the host to wall off the area.

Vanderveken (J.). **Contribution à l'étude de la rosette de l'Arachide.** [A contribution to the study of Groundnut rosette.]—*Parasitica*, **17**, 1, pp. 1–21, 1 pl., 1961. [Fr., Flem., Engl., Germ. summ. 12 ref.]

Groundnut rosette virus disease was studied at the Institut Agronomique, Gembloux, Belgium, in groundnut plants from Yangambi, Congo [**40**, 391]. Transmission by *Aphis craccivora* did not appear to be affected by light or temp., but the Congo plants were better sources of virus than inoculated ones. The min. feeding-period was usually 48 hr. but transmission was occasionally possible even with only 1 hr. No transmission was obtained with *Myzus persicae* or *M. ascalonicus* or mechanically. Inoculation of creeping vars. induced reddish or brown necrotic lesions on the leaves, stems, and stipules, but these did not appear on the erect var. A 92; experimental evidence indicated that the development of the symptoms depended on quantitative rather than qualitative factors, i.e. on the rapid multiplication of the mosaic component and the precocity of the mosaic symptom, which is more readily discernible than the rosette. The absence of necrotic symptoms on A 92 appeared to be due to its general resistance. The virus did not appear to multiply in any of 36 plant spp. inoculated, except possibly *Centrosema plumieri* and *Petunia nana compacta*, both of which developed chlorosis and dwarfing, though the virus could not be re-isolated from them.

Husain (S. M.). **Some aspects of the life history, epiphytology, and control of Alternaria porri (Ellis) Ciferri, the cause of purple blotch of Sweet Spanish Onions.**—*Diss. Abstr.*, **21**, 6, p. 1324, 1960.

The pathogen overwinters under N.Y. State conditions in onion debris. Sporulation was not obtained on leaf lesions on greenhouse-grown seedlings by naturally produced spore inoculum, but spores were produced on lesions on field plants by similar inoculum. Max. spores were recorded [cf. **39**, 524] in a spore trap between 2 and 4 p.m. when R.H. was lower than at the other 2 hour periods. In 1956 best leaf blight control was obtained with dyrene at 5-day intervals, 8 applications with a power sprayer; this was followed closely by oleocuivre (40% Cu_2O) and maneb, then by nabam, iron vancide (70% ferbam+Fe salt of 2-mercaptobenzothiozole), captan, and griseofulvin, in that order. In 1957 the 4 lb. rate for dyrene, oleocuivre, and maneb (70%) was no better than the 2 lb. Only dyrene and oleocuivre reduced *Botrytis* storage rots.

In 1958 dyrene, maneb, and oleocuivre were again superior, in that order, to thiram, ziram, and cyprex. In 1956 and 1958 yields were in general correlated with

leaf blight control but storage rots (spp. of *Alternaria*, *B.*, *Fusarium*, and bacteria) were not. In 1959 5 of 36 antibiotics screened at Cornell Univ. were active *in vitro* against *A. porri*. Dyrene provided the best control of leaf blight, but candicidin, filipin, and GSl had similar effects on yields and storage rots. The latter were not reduced by post-harvest fungicidal dips, disinfestation of shears between toppings, hot air or infra-red treatment of bulbs, fumigation of bulbs with methyl bromide, or waxing of bulbs previously dipped in fungicides.

Smith (H. C.), Giesen (H. J.), & Allen (J. D.). **Control of motley dwarf virus disease in Carrots.**—Reprinted from *N.Z. Comm. Grower*, Aug., 2 pp., 1 fig., 1960.

In New Zealand the virus 1st showed itself in root and leaf stunting on carrots growing at Blenheim in Dec. 1954 [**39**, 80]. The results of field trials at D.S.I.R., Lincoln, are presented, from which control recommendations are: sowing of resistant or refraining from sowing susceptible vars. during carrot aphid (*Cavariella aegopodii*) flight periods, and insecticide spraying. Non-resistant vars. may suffer up to 50% loss in early sowings. Spraying should be done at fortnightly intervals from emergence until mid-Nov., allowing 4 weeks between the last spraying and harvest.

Rodenburg (C. M.). **A cheap method of testing Spinach plants for blue mould resistance during the summer months.**—*Euphytica*, **10**, 1, pp. 31–34, 2 pl., 2 graphs, 1961. [Dutch summ.]

For testing spinach plants [**37**, 615] for reaction to *Peronospora effusa* throughout the year at the Inst. of Horticultural Plant Breeding, Wageningen, Netherlands, a tent with a cheap cooling plant is used with 100% success. It consists of a tube frame covered with plastic over large-mesh gauze which prevents it from sagging. On a concrete or tile floor under this frame trays containing young plants are placed. A metal water tube with 1 mm. holes 10 cm. apart, from which water at 12° C. spouts up, is suspended over the plastic cap, the jets being broken up against a slightly downcurved plate so that the water rebounds from the plastic, partly in drops, partly in a mist, which keeps the temp. under the plastic below 15–20° despite day heat; the water flowing over the floor keeps air humidity at 90–100%. For a tent 2·76 × 1·35 m., about 8 l. water/min. are needed; as soon as outside temp. falls below 15° the tap should be closed. On sunny days shading is needed, but the walls round the tent should be painted white. Infection being completed after 3 hr., the trays can be taken out but must be returned after ca. 8 days to aid sporulation. To make sure that the susceptible control is completely diseased after 14 days, the trays must be kept in the tent for a week. Sowings should be at 2-week intervals. The apparatus has also been used successfully to test endive against *Marssonina panattoniana*, peas against *P. viciae*, and *Viola tricolor* against *P. violae*.

Wakabayashi (S.). **Studies on the virus diseases of Amorphophallus koniac.**—*Proc. Crop Sci. Soc. Japan*, **29**, 3, pp. 369–372, 2 fig., 1961. [Jap., Engl. summ.]

Yellowing of *A. koniac* [*A. rivieri* var. *konjac*: cf. **4**, 394], frequent in the field, was shown to be due to a virus by corm grafting and other tests. Environmental factors are discussed in relation to the occurrence of the disease. Experimental data and observations showed that leaf deformity is the result of infection. Infected leaves are generally short, petioles light green and indistinctly spotted, colour generally pale, frequently with mosaic, and blade development poor. X-bodies were not present. The corm decreases in yield with the progress of the disease, which was not seed transmissible.

Baluł (Wanda). **Obserwacje nad chorobami nasion i siewek Dyni oleistej i próby ich zwalczania.** [Observations on the diseases of oil Squash seed and seedlings and control tests.]—*Prace nauk. Inst. Ochr. Rośl., Poznań*, **2**, 1, pp. 163–197, 12 fig., 1 graph, 1960. [Russ., Engl. summ.]

In further studies at the Inst. Plant Prot., Reguły, Poland [cf. **39**, 529], the external microflora of oil squash (*Cucurbita pepo* vars. *syrica* and *oleifera*) seed was more abundant than the internal, the latter including bacteria and fungi, of which 9 *Fusarium* spp., vars., and ff. were the chief causal agents of poor seedling emergence [cf. **40**, 646]. Infection was incited by soil-borne rather than seed-borne fungi. Seed treatments with 0·25% $HgCl_2$ for 5 min. or with fungitox T dust at 0·18–0·4% seed wt. were highly effective, those with fungitox OR, agronal, tillex, spergon, phygon, and ziarnik less so. Suitable soil temp. and humidity are considered important for good emergence.

Hadwiger (L. A.) & Hall (C. V.). **The relation of pigmentation and free amino acid content with resistance to Colletotrichum lagenarium in Water-melons.** —*Plant Dis. Reptr*, **45**, 5, pp. 373–374, 1 fig., 1961.

The colour on mature fruits of Garrison watermelon has a distinct influence on the virulence of *C. lagenarium* [**40**. 139], studied under field conditions at the Kansas agric. Exp. Sta., Manhattan. Lesions were concentrated chiefly on the dark green stripes, the tissue of which contained much higher quantities of citrulline and glutamine and slightly higher quantities of alanine and aspartic acid than the light green stripe tissues. Tissue below the dark green layers also contained much more of the 2 first-named substances than that below the light green.

Nagaich (B. B.) & Singh (B.). **Damping-off of cucurbitaceous vegetables and its control.** —*Agra Univ. J. Res. (Sci.)*, **9**. 1, pp. 125–135, 1960. [15 ref.]

The cause of pre- and post-emergence damping-off was determined at the Govt agric. Coll., Kanpur, India, as *Pythium aphanidermatum* [cf. **38**, 442, 663]. Dense sowing and high soil moisture (60–90%) favoured infection, to which 3–5 days old seedlings were most susceptible. Seed treatment with ceresan, cuprocide, and phygon gave good control, but at higher dosages they inhibited germination. Soil treatment with formalin largely checked the disease.

Raski (D. J.) & Hewitt (W. B.). **Experiments with Xiphinema index as a vector of fanleaf of Grapevines.** *Nematologica*, **5**, 3, pp. 166–170, 1960.

Evidence was obtained at Univ. Calif., Davis, that vine fanleaf virus [vine infectious degeneration virus: **40**, 263] may be transmitted by *X. index* [loc. cit.] to the roots of healthy vines within 24 hr. of introduction to them. The virus persists in the vector for at least 30 days, during which period the nematodes can survive in the absence of the host and still remain able to transmit.

Lafon (J.), Couillaud (P.), & Gay-Bellile (F.). **Essais de 'microtraitements' de pulvérisation pneumatique dans la lutte contre le mildiou de la Vigne (5 à 15 litres par hectare).** [Trials with 'micro-applications' of pneumatic sprays against Vine downy mildew (5–15 l./ha.).] —*C.R. Acad. Agric. Fr.*, **47**, 6, pp. 325–336, 1961.

In 1960 at the Station Viticole de Cognac, France, vines with downy mildew [*Plasmopara viticola*] were given 6 applications of Cu oxychlorides A, B, and C, Cu-zineb, phaltan, organic Cu (talloleate), and oily Cu oxychloride S, at 5–15 l./ha., in comparison with 2% and 0·5% Bordeaux mixture applied by the usual method at 500 l./ha. The results obtained demonstrated that knapsack applications at 10 l./ha. were as effective as those at 50–60 l./ha. The method is technically

feasible and efficacious. In practice, however, it is not considered advisable to use less than 30–50 l./ha. [cf. **37**, 630]. Applications at under 10 l./ha. may prove practicable with oily materials.

Taschenberg (G. F.), Mack (G. L.), & Gambrell (F. L.). **Pesticide residues. DDT and copper residues in a vineyard soil.**—*J. agric. Fd Chem.*, **9**, 3, pp. 207–209, 1 diag., 1961.

A tabulated report is presented from the N.Y. St. agric. Exp. Sta., Geneva, on the results of analyses of gravelly loam soil samples from a vineyard in the Chatarequa district to which 3 or 4 regular spray treatments with Cu compounds had been applied for 6 and 11 yr. Before any applications were made the Cu content was 40 p.p.m.; after 6 yr. the top 3-in. layer contained twice as much, but the lower 3-in. was unchanged. At the end of 11 yr., however, the increase in the top 3 in. was 3-fold, while the lower 3-in. contained nearly double the original.

Report of the Rothamsted Experimental Station for 1960.—329 pp., 1 graph, 1 map, 1961.

In the report [cf. **40**, 1] from the Plant Path. Dept (P. H. Gregory, pp. 115–128), some of the information in which has been noticed, A. Kleczkowski states that when purified protein from tobacco mosaic virus is disaggregated at pH values above 6·5 it behaves like a mixture of at least 7 different antigens. When reaggregated at lower pH, however, it behaves as a serologically homogeneous material. Claims that a determinant is lost when the virus is broken up into protein and nucleic acid and is regained when the protein is reaggregated were not confirmed.

B. Kassanis records that when cultured under light for 18 hr. daily in media containing 2% sucrose 'tobacco conditioned callus tissue' (some infected by TMV) was white, but when the sugar was gradually decreased to 0·25 it became green, a reversible phenomenon.

A. J. Gibbs, H. L. Nixon, & R. D. Woods report that purified preparations of lucerne mosaic virus contain bacilliform-like particles (18 mμ wide; mostly 36, 48, or 58 mμ long) unlike those of any other known virus in shape and apparent structure; A. Attafuah isolated 3 strs. of lucerne mosaic virus, all transmissible by *Myzus persicae*, *Neomyzus circumflexus*, and *Acyrthosiphum pisum*.

Studies by B. D. Harrison (with R. D. Winslow, Nematology Dept) on the ecology of the nematode vector *Xiphinema diversicaudatum* in relation to outbreaks of arabis mosaic virus [**39**, 427] revealed the highest nematode populations in soil from woodlands and hedgerows [cf. **40**, 759]. The virus was isolated from wild trees, and an outbreak was seen in strawberries on newly cultivated land. The proportion of infective nematodes found in different localities varied greatly. The virus appeared to persist in the nematodes for long periods. In collaboration with the Scot. hort. Res. Inst. it was shown that field outbreaks of the beet ringspot str. of tomato black ring virus [**40**, 143] in raspberry and strawberry are associated with the nematode *Longidorus elongatus* in the soil. Sandy soil from a field of potatoes severely affected by spraing proved to be infested with tobacco rattle virus [cf. loc. cit.], which is thought to cause the disease. The rattle virus was experimentally transmitted by *Trichodorus primitivus*.

Marion A. Watson, R. C. Sinha, & E. P. Serjeant found that carrot motley dwarf virus [**40**, 392] is transmissible from carrots by manual inoculation if the clarified sap is buffered at pH 7, also in water-phenol extracts, presumably containing mostly virus nucleic acid; with both the infection end-points were about 1/1,000. Field spraying with metasystox on 13–14 June and 4 July decreased infection by 21% and increased yield by 2·02±0·526 tons/acre.

In further work by M. A. Watson [**40**, 356], when the virulent barley yellow

dwarf virus B (transmissible by *Rhopalosiphum padi*, *Sitobium* [*Macrosiphum*] *avenae*, and *S.* [*M.*] *fragariae*) was inoculated to oat seedlings, together with the avirulent str. X (transmitted only by *M.* spp. and inducing a typical red foliage discoloration), they remained in the plants for at least 3 months and could be isolated by their vectors with little change in their proportions. When, however, one was inoculated into the plants 14 days after the other, that introduced 1st established supremacy, and though both could be re-isolated easily within 30 days of the 2nd inoculation, the 2nd virus was seldom obtained after 60 days, even if it was more virulent than the 1st and had produced symptoms. *R. padi* could transmit avirulent viruses resembling X from plants with mixed infection; these avirulent forms came mostly from plants infected by *M. fragariae* after feeding on a leaf infected with both viruses.

A. J. Gibbs found that most crops of broad beans in S. England had 0·1% or less plants affected by broad bean true mosaic virus [cf. **39**, 139], but a few had up to 10%. The evidence suggested that all primary infections were from the seed, imported mainly from N. Africa. In late-sown crops secondary spread occurred up to 25 yd. Early infection reduced the number of pods/plant and lowered seed yield by 20%. Purified preparations of the virus contained 'spherical' particles about 28 mμ diam., resembling those of the soil-borne ring spot viruses or red clover mottle virus. Attempts at transmission by *X. diversicaudatum*, *Ditylenchus dipsaci* (giant race), and *Sitona* sp. failed.

Mary D. Glynne states that in the 6-course rotation experiment (1930–60) potatoes, rye, sugar beet, barley, clover, and wheat were grown in that order. A trace of take-all (*Ophiobolus graminis*) was present on the wheat, an annual mean of $< 1\%$ of plants having lightly infected seminal roots; eyespot (*Cercosporella herpotrichoides*) [cf. **39**, 19] occurred yearly, more than half the straws being infected in 5 of 20 yr. (1938–57), incidence being lowest in 1947 (2·3%) and highest in 1958 (98·7%) when the whole crop lodged. Barley and rye were lightly attacked but had fewer infected straws and fewer severe eyespot lesions than winter wheat; they helped, however, to carry the disease through the rotation.

In mid-June a few wheat plants with yellow striped leaves were found by D. B. Slope, diagnosed as caused by *Cephalosporium gramineum* [cf. **39**, 686].

J. M. Hirst & O. J. Stedman continued their studies on potato blight (*Phytophthora infestans*) epidemics [cf. **40**, 380], on haulm resistance, and on control by fungicidal spraying. Lowings' findings [**39**, 491] on the effect of N fertilizers on disease development could not be confirmed.

J. Lacey, studying the activity of *P. infestans* in soil, found that a promising method of assessing the conc. of the fungus there was to use tuber tissues as 'bait'. Slices 5 mm. thick, cut from washed tubers, were covered with 0·75 ml. of soil, wetted, stored in humid chambers at 20° [C.] and after 24 hr. cut into octants. A week later those bearing sporangia were counted. After application of the multiple-infection transformation, there was a significant linear relation between the number of sporangia/slice and the number of octants infected. The method should make it possible to detect as few as 10 sporangia/ml. of soil. When approx. half the crop had been destroyed the spore conc. was estimated thus to be 2,000/ml. in the surface soil, 440 at 2 in., and 50 at 4 in.

M. V. Carter assessed the 'dew-release' of ascospores of *Mycosphaerella pinodes*, about 50 g. of heavily infected dry pea haulm being placed on a frame carried upwind of the orifice of a Hirst spore trap, without the rain-shield and exposed repeatedly to dews during the autumn. Dew was recorded by an adjacent Surface Wetness Recorder Mk. III. Release began when the trace was half-way up the scale, usually reached a max. 3 hr. later, and dropped to zero during the next 6 hr. A. C. Hastie describes further investigations of genetic recombination in *Verticillium alboatrum* [**40**, 421] in some detail.

In the report from the Insecticides and Fungicides Dept (C. POTTER, pp. 139–153) F. T. LAST using triphenyltin acetate in the field in comparison with Cu oxychloride and zineb at 0·75, 2·5, and 1·3 lb. of active material/100 gal., respectively, against potato blight found that they delayed the destruction of the foliage (50% stage) by 8, 10, and 18 days, respectively, and increased yields of healthy tubers by 0·4, 1, and 3·8 tons. Infection was severe on the unsprayed, which yielded 9·9 tons healthy tubers/acre.

The effects of *Erysiphe graminis* on the growth of spring-sown barley were analysed by F. T. LAST with the aid of fungicidal sprays. Soon after leaf infections appeared the dry wts. of the roots decreased. Later, infection decreased leaf area and the numbers of tillers. The decreases in the root system were disproportionately large, causing the ratio (w/w) of roots to living leaf lamina to decrease. Infected plants produced fewer and smaller ears than healthy ones: this decrease may, possibly, be associated with a lower net assimilation rate.

From the Soil Microbiology Dept (P. S. NUTMAN, pp. 84–93) experiments on mycorrhizal infection under aseptic conditions are described by BARBARA MOSSE & R. COOPER. Mycorrhiza were successfully established in several plants including clovers, wheat, cucumber, and onion.

KEYWORTH (W. G.). **Plant pathology report.**—*Rep. nat. Veg. Res. Sta., Warwick*, **11** (*1960*), pp. 47–50, 1961.

In this report [cf. **40**, 4] J. A. TOMLINSON & BRIDGET R. SMITH record that a new Zn frit, more finely ground and containing 36% ZnO, gave good control of crook root [*Spongospora subterranea* f.sp. *nasturtii*] of watercress over 5 months throughout the beds when applied at 5 oz./sq. yd. to the top 25 yd. At Wilsthorpe, Lincs., $ZnSO_4$, continuously drip-fed to give 0·1 p.p.m. Zn in an artesian water supply supplying several watercress beds, reduced infection to 1–2% in 6 weeks and eradicated it in 8, whereas in untreated beds it was 55–70%.

R. B. MAUDE demonstrated seed-borne transmission of *Didymella lycopersici* on tomatoes [**40**, 386].

Laboratory pathogenicity tests by A. G. CHANNON showed that *Itersonilia* sp. causing a disease of chrysanthemum florets would not infect parsnip roots or leaves, and the sp. causing parsnip canker would not infect chrysanthemums [**39**, 261]. Calomel at 10% and 2% [**40**, 640] caused marked reductions in *Plasmodiophora brassicae* on summer cabbage, while moderate control was obtained with 0·4% and 0·08%. All the Wisconsin selections [**40**, 443] except 1 were more heavily infected than in the previous year and little better than the susceptible.

Further tests by R. B. MAUDE showed that after soaking pea seed in 1% captan at 30° C. no infection by *Mycosphaerella pinodes* was visible on the seed after 9 days' incubation, and there was no loss in viability. Other fungicides, except thiram, were strongly toxic to seedling development.

In fungicide tests by J. A. TOMLINSON & BRIDGET R. SMITH *Olpidium brassicae* on lettuce was controlled by the admixture of 0·05% w/w quintozene with infested soil though only partially controlled by 0·025%; it was also eliminated by soil saturation with 0·5% formaldehyde. Both techniques may be of value in glasshouses but are unlikely to be economic in the field. Lettuce and cucumber mosaic viruses were repeatedly isolated from lettuce, often together. A 3rd virus, symptomless on this host, was sometimes isolated from lettuces over a wide area and is under study.

Further tests by M. J. W. WEBB & J. A. TOMLINSON on the resistance mechanism in turnips to *Erysiphe polygoni* showed that other chelating agents such as sodium diethyl dithiocarbamate also remove resistance. Resistance also developed in 8 other crucifer spp. (listed) when watered with $ZnSO_4$ solution, whereas peas remained susceptible.

Braconnier (R.) & Granhall (I.). **Annual report 1960–61, European and Mediterranean Plant Protection Organisation.**—23 pp., 1 map, Paris, 142, Avenue des Champs-Elysées, 1961. [With Fr. translation.]

In this report [cf. **37**, 635] the subjects dealt with include tobacco blue mould (*Peronospora tabacina*) [**40**, 629], a 1960 international conference on potato diseases caused by *Corynebacterium sepedonicum* and *Pseudomonas solanacearum*, the report of the working party on citrus tristeza and xyloporosis viruses (Portici, 1956) [**36**, 526], that of the international conference on citrus virus diseases (Acireale, 1959) [**39**, 577], and the severe outbreak of pear fire blight (*Erwinia amylovora*) in England [**38**, 267].

Jamalainen (E. A.). **Activities of the Department of Plant Pathology of the Agricultural Research Centre during the period 1911–1960 and its present activity.** — *Valt. Maatalousk. Julk.* 188, 60 pp., 28 fig., 1961. [Finn. & Engl. texts. 8 pp. ref.]

A review of the work of the Dept at Tikkurila, nr. Helsinki, Finland.

Report on the Sixth Commonwealth Mycological Conference, 1960.—164 pp., Commonwealth Mycological Institute, Kew, Surrey, 1961. 20*s*. net.

The report of the Technical Committee is followed by resolutions adopted (p. 8) [cf. **35**, 81], which recommended world-wide attention to the reduction of troublesome plant diseases by use of eradicative measures, the reduction of losses by seed-borne diseases through improved certification, increased research on root diseases, particularly of trees, attention to ways of assessing and publicizing the benefits of increased control application, and the inclusion of nematology in mycological training with improved facilities for training nematologists; the continued need for taxonomic research to ensure accurate identification of pathogenic spp. was emphasized.

The Proceedings contain the Director's review of the work of the Commonwealth Mycological Institute for 1954–60 (pp. 11–16) and the papers read, published for the most part in full, with the discussions on each subject. G. C. Ainsworth & Grace M. Waterhouse (C.M.I.) reported (pp. 17–25) on the present scope of *R.A.M.* compared with earlier days and on other C.M.I. information services. Papers on taxonomy in relation to plant pathology (pp. 26–39) included A. J. Skolko (Ottawa), The status of taxonomic mycology in present day plant pathology; M. B. Ellis (C.M.I.), Herb. I.M.I. and the identification service [**39**, 768]; H. A. Dade (C.M.I.), The C.M.I. culture collection; Agathe L. Van Beverwijk (Baarn), Are 'type cultures' type material?; A. C. Hayward (C.M.I.), The identification of plant pathogenic bacteria; and R. A. Lelliott (Harpenden), The functions of a culture collection of plant pathogenic bacteria and bacteriophages.

Papers on root diseases (pp. 39–56) were by I. A. S. Gibson & N. A. Goodchild (Kericho, Kenya), *Armillaria mellea* [cf. **40**, 569] in Kenya tea plantations, spread by airborne spores; ring barking [**16**, 564] has not proved effective in control. A. Riggenbach (R.R.I., Ceylon), Recent progress in the control of the white root disease (*Fomes lignosus*) of *Hevea* rubber [**40**, 624]; R. A. Fox (R.R.I., Malaya), White root disease of *Hevea brasiliensis*: recent developments in control techniques [loc. cit.]; D. A. Perry (Namulonge, Uganda), The interaction of *Fusarium oxysporum* f. *vasinfectum* and *Meloidogyne* spp. on cotton [**39**, 580]; J. S. Murray (For. Comm., Alice Holt), Control of *Fomes annosus* in Britain to-day [**40**, 567 *et passim*]; and C. D. Blake (N.S.W. Dept Agric.), *Radopholus* root rot of bananas.

The session on seed pathology (pp. 57–75) included papers by Mary Noble (Dept Agric., Scotland), Seed pathology—retrospect and prospect; P. Neergaard (Copenhagen), Uniformity in seed health testing [**39**, 650]; and J. De Tempe

(Wageningen), The present state of health testing of seeds (3 fig., 5 graphs) [**40**, 517].

Papers on disease forecasting and assessment (pp. 75–94) were by E. C. Large (Harpenden), Forecasting and assessment, progress curves; forecasting of potato blight [*Phytophthora infestans*] is reviewed, with reference to 'climagrams' [**39**, 612]; J. E. Van der Plank (Pretoria), Errors due to spore dispersion in field experiments with epidemic disease [**40**, 12]; D. Mulder & R. L. de Silva (Tea R.I., Ceylon), Blister blight (*Exobasidium vexans*) control in tea based on sunshine records [**39**, 735]; L. Ogilvie & I. G. Thorpe (N.A.A.S., Bristol), Black rust of wheat [*Puccinia graminis*], co-operative investigations in Western Europe and North Africa [**40**, 526]; C. Logan (Namulonge, Uganda), An estimate of the effect of seed treatments in reducing cotton crop loss caused by *Xanthomonas malvacearum* in Uganda [**40**, 224]; K. E. Hutton (N.S.W.), Availability of *Venturia inaequalis* and *V. pirina* ascospores in N.S.W. The seasonal pattern was followed with the Hirst spore trap, the spraying schedule modified, and a warning service inaugurated. E. Hainsworth (Dept Agric., Kenya), An estimate of the avoidable losses from plant diseases in Kenya.

Papers on fungicides (pp. 94–112) were: G. C. Marks & J. W. L. Peiris (Dept Agric., Ceylon), The comparison of the efficacy of antimycin, blastomycin and blasticydin 'S' with mercurial fungicides for controlling blast (*Piricularia oryzae*) of rice; R. A. Fox (Malaya), White root disease of *Hevea brasiliensis*: the role of fungicides in control techniques [**40**, 244 *et passim*]; D. M. Spencer (Wye Coll.), Volatile fungicides and their possible use in crop protection. Synthesized volatile compounds related to captan and the aryloxy acids were tested on apples infected by *Gloeosporium perennans* [*Pezicula malicorticis*: **40**, 115]. D. Priest & R. K. S. Wood (I.C.S., London), Adaptation of fungi to fungicides [**38**, 453].

Papers on virus diseases and cereal rusts (pp. 112–139) included D. Mulder & R. L. de Silva (Ceylon), The relation between air temperature and the occurrence of symptoms of phloem necrosis virus disease [**40**, 323]; J. W. L. Peiris (Ceylon), Tristeza disease in Ceylon affecting orange seedlings [**40**, 222]; C. J. Magee (N.S.W.), The latent infection problem in the control of abaca (Manila hemp) mosaic. Symptoms are described; their latency in appearance complicates the establishment of clean plantings. L. R. Fraser (N.S.W.), Leafroll [virus] of grapevines in New South Wales [**38**, 563; **39**, 655]; F. H. G. Lupton & R. C. F. Macer (Cambridge, U.K.), The genetics of yellow rust (*Puccinia glumarum*) [*P. striiformis*] resistance in wheat [**40**, 526]; I. A. Watson (Univ. Sydney), Basic aspects of breeding rust resistant wheats (4 maps, 1 graph), which deals particularly with the problems of new races of *P. graminis* and *P. recondita* in Australia and N.Z.; and R. H. Cammack (Harpenden), *Puccinia polysora*: A review of some factors affecting the epiphytotic (on maize) in West Africa [**38**, 514].

Papers on diseases of cacao and black pepper (pp. 139–162) were by J. W. Blencowe & A. L. Wharton (W.A.C.R.I., Ghana), Black-pod disease [*Phytophthora palmivora*] in Ghana: incidence of the disease in relation to levels of productivity (4 graphs, 1 map) [**40**, 599]. Methods of collecting data are described and it concluded that application of fungicides to peasant-grown cacao would be uneconomic. P. D. Turner (W.A.C.R.I.), Strains of *P. palmivora* occurring in West Africa [**40**, 521]; A. A. Brunt & A. L. Wharton (W.A.C.R.I.), A gall disease of cocoa (*Theobroma cacao* L.) in Ghana (6 fig., 1 map) [cf. **40**, 600], believed to be due to a bacterial or fungal pathogen. [It has since been shown to be caused by *Calonectria rigidiuscula* (*Commonw. phytopath. News*, **7**, 3, pp. 44–45, 1961)]; P. Holliday (C.M.I.), A root disease of black pepper in Sarawak, giving an account of a wilt disease caused by *Phytophthora* sp. [**40**, 74, 272]; E. F. Iton (I.C.T.A., Trinidad), *Ceratostomella* wilt in cacao, describing the disease caused by *C.* [*Ceratocystis*] *fimbriata* in Trinidad [**39**, 685].

Thomas (A. N. C.). **Annual Report of the Department of Agriculture, British Honduras, for the year 1959.**—14+2+iv unnumbered pp., 1961.

This report [cf. **36**, 381] notes (para. 26) the occurrence of cushion gall of cacao [**40**, 600] at Alta Vista and (para. 29) that hoja blanca [virus] disease of rice caused 90% loss of crop in the Belize district [**39**, 573].

Agricultural Research.—*Rep. Indian Coun. agric. Res., 1957–58*, pp. 7–57, 1960. [Received July 1961.]

Some of the information in this report [cf. **39**, 372; **40**, 9, 652] has been noticed. In the Mycol. sect. (pp. 25–26) a dieback of cashew nut [*Anacardium occidentale*] at Coimbatore, Madras, caused by *Pellicularia* [*Corticium*] *salmonicolor* is reported. On the same host grey blight (*Pestalotia dichaeta*) was widespread, predominantly on older leaves; insect injuries, with subsequent infection by *Gloeosporium mangiferae* and *Phomopsis anacardii* and resultant shoot drying, represent a major problem. Inflorescence drying caused by *G. mangiferae* was widespread but of variable intensity. *Aspergillus niger* and *Rhizopus* sp. affected up to 18% of the kernels in storage, possibly because immature nuts were stored. Under bananas (pp. 28–29), investigations into control measures of bunchy top virus [map 19] in Kerala State are noted.

Memoria técnica del Instituto de Fitotecnía período 1° de Agosto de 1955 al 31 Julio de 1959. [Technical report of the Inst. of Phytotechnics for 1 Aug. 1955–31 July 1959.]—Buenos Aires, Argentina, Inst. Nac. de Tecnologia agropecuaria, pp. 73–101, 5 fig., 1960.

In the Plant Genetics sect. (pp. 74–78) E. A. Favret, A. A. Rodríguez, Julieta Pacheco, W. Godeck, Elsa Malvárez, E. Lipschitz, & Fanny Manso report that subjecting Sinvalocho M.A. wheat markedly susceptible to races 17 and 15 of *Puccinia graminis* [**40**, 35] to 10,000 r. of CO^{60} gamma rays produced 3 M_2 plants resistant under field conditions.

In the Plant Immunology sect. (pp. 79–90) H. P. Cenoz & J. Vallega report that in 1958 *P. recondita* [**40**, 294] caused great losses in several wheat vars., race Arg. 20 (U.N. 9) being the commonest as in former years, and race Arg. 2 (U.N. 2) next. In 1956–58 all oat vars. were severely attacked by *P. coronata* [**30**, 518], except the Institute vars. Magnif 28 and Magnif 29 and the related Santa Fe no. 3 [cf. **32**, 371], while the Canadian vars. Canuck and Garry showed good resistance to inoculation with many rust races, the commonest in nature being 236 and 237 in the group Arg. 1. In 1956 2 new races of Arg. 56, 291 and 292, were isolated.

J. L. Tessi, J. H. Frecha, & J. Vallega have detected 3 factors, 2 of them linked, for resistance to race 15 of *P. graminis* [cf. **30**, 147] in the wheat vars. Disro-1, Magnif MG, Kentana 51 A. Yaqui 53, Egypt N.A. 101-Timstein, N.D. no. 1, Kenya 350, Kenya 321, and Frontana R.L. 2265-Redman, and a resistance conditioned by the same factors to races 2 and 141 of *P. recondita* in Malakoff. Quinn barley possesses a single factor for resistance to local races of *P. hordei* [**38**, 78].

Of the sorghum pathogens, only *Colletotrichum graminicola* [cf. **29**, 299] was of economic importance during 1950–56, according to J. L. Tessi, who lists 8 vars. resistant to it.

In the Improvement sect. (pp. 90–99) J. B. Goldenberg reports that 3 pea vars., Lincoln, Holandesa, and Herkku Delicatess, were resistant to *Mycosphaerella pinodes* and *Ascochyta pisi* [**37**, 432] in both greenhouse and field; Porto Alegre, Antuna, Fabriquera, and the lines Ojo Negro 1157/56, 1626–56, and 1825/56 in the field only.

A. von der Pahlen reports a severe mosaic virus attack on *Capsicum* at Castelar in 1958–9, least severe on the Ambato var., one line of which showed some resistance

of the hypersensitive type in a certain percentage of inoculated plants. Two virus diseases, 'black plague' and 'black streak' [**26**, 84], were virulent in tomato in 1957. Tobacco mosaic and potato virus X complex were detected, but in 1958 only tobacco mosaic was found in a high percentage of infected plants at Castelar and round La Plata, the var. Platense being relatively tolerant.

Johnston (A.). **A preliminary plant disease survey in Netherlands New Guinea.**—44 pp., Rome, Food and Agric. Organization of the United Nations, 1961. [Mimeographed.]

This further survey [cf. **40**, 395] is based on observations made during a 4-week visit in May 1960. Black pod and canker (*Phytophthora palmivora*) were the most damaging diseases of cacao. The stem canker phase was severe mainly on certain selections and under conditions of excessive soil moisture. Only 1 major disease of rice was found, brown spot (*Cochliobolus miyabeanus*); attack was very severe and investigations into methods of control are required. Scab (*Elsinoe batatas*) on sweet potato was widespread and capable of causing considerable damage under conditions favourable to the parasite. Witches' broom and mosaic of sweet potato are thought to be caused by viruses, but this needs confirmation; the former is the more serious and plants are badly stunted by it. From observations at Amban Exp. Sta. it seems that some sweet potato vars. possess resistance. Mosaic was found in several scattered plantings at Bokondini.

Some damage to banana by *Mycosphaerella musicola* [**33**, 339] and *Cordana musae* [map 168] was noted but Panama disease (*Fusarium oxysporum* f. *cubense*) and bunchy top virus disease are believed to be absent, as apparently are most of the serious citrus diseases, including canker (*Xanthomonas citri*) [**35**, 97] and the various common virus diseases. Coffee rust (*Hemileia vastatrix*) was not found.

Tuinbouwkundig onderzoek: Jaarverslag 1959. [Horticultural research: annual report 1959.]—'s Gravenhage, Directie Tuinbouw, xli+365 pp., 1959. [Received July 1961.]

This comprehensive publication covers the work done by research institutions in the Netherlands, with a summary of each project and the results. Investigations on plant disease are noticed in the sections covering various types of crops and there is an English index.

Gray (P.) (Editor). **The Encyclopedia of the Biological Sciences.**—xxi+1119 pp., illus., New York, Reinhold Publishing Corporation; London, Chapman & Hall, Ltd., 1961. 160*s*.

The 800 or more specially written articles (each with general and cross-ref.) by experts from various countries cover the broad field of the biological sciences in their developmental, ecological, functional, genetic, structural and taxonomic aspects, the terms used, and famous biologists. The various groups of fungi, viruses, and bacteria are included.

Clark (G. L.) (Editor). **The Encyclopedia of Microscopy.**—xiii+693 pp., illus., New York, Reinhold Publishing Corporation; London, Chapman & Hall, Ltd., 1961. 200*s*.

This comprehensive work [cf. **40**, 583], by an international team of distinguished microscopists, contains over 140 specially written papers on 26 different kinds of microscopy, arranged alphabetically, and mostly with numerous alphabetically arranged sub-topics. The book contains over 600 photographs, diag., etc., and lists of references. The special types of microscopy include chemical (12 papers, pp. 13–72), electron (37 papers, pp. 72–315) [cf. **40**, 453], general (6 papers, pp. 343–400), stereoscopic (3 papers, pp. 538–541), and X-ray (17 papers, pp. 561–693).

D. E. Bradley (pp. 80–91) deals with the botanical applications of electron microscopy, B. E. Juniper (pp. 177–181) with leaf surfaces [**38**, 392], and F. Bohatirchuk (pp. 591–627) with medico-biologic research by micro-radiography.

Christensen (C. M.). **The molds and man. An introduction to the fungi.**—viii+238 pp., 8 pl. (14 fig.), 8 fig., Univ. Minnesota Press, Minneapolis (London, Oxford Univ. Press), 1961. $1.75 (paper covers), $4.75 (cloth).

In this 2nd and revised edition [cf. **31**, 393] the text has been brought up to date and new photographic illustrations added.

Hockenhull (D. J. D.) (Editor). **Progress in industrial microbiology. Vol. 3.**—vii —230 pp., numerous graphs, London, Heywood & Co. Ltd., 1961. 50*s*.

The reviews in this vol. [cf. **39**, 667] include the comprehensive 'Recent research on the yeasts' (pp. 1–41: 175 ref.) by H. J. Bunker and 'Studies in aeration and agitation' in large scale deep cultures (pp. 141–172; 73 ref.) by J. W. Richards.

Gunsalus (I. C.) & Stanier (R. Y.) (Editors). **The Bacteria : A treatise on structure and function. Vol. II : Metabolism.** –xv+572 pp., New York and London, Academic Press, 1961. $15.

This vol., the 2nd of 5, maintains the very high standard of the 1st [cf. **40**, 274], and includes useful chapters on 'Fermentation of carbohydrates and related compounds' by W. A. Wood (pp. 59–149), 'The dissimilation of high molecular weight substances' by H. J. Rogers (pp. 257 -318), and 'Bacterial photosynthesis' by D. M. Geller (pp. 461–478).

Krieg (A.). **Bacillus thuringiensis Berliner : über seine Biologie, Pathogenie und Anwendung in der biologischen Schädlingsbekämpfung.** [*B. thuringiensis*: its biology, pathogenicity, and use in biological pest control.]—*Mitt. biol. BdAnst. Berl.* 103, 79 pp., 10 fig., 1961. [13 pp. ref.]

This useful and comprehensive monograph includes a sect. on the control of insect pests [**38**, 452].

Ten Houten (J. G.). **Climatological factors influencing the effectivity of fungicides.** —*Horticultura*, **15**, 5, pp. 97–101, 1961. [41 ref.]

An interesting review of the varying performance of fungicides when used under different climatic conditions and the factors involved, with reference to the reasons for the phytotoxicity of some. The different behaviour of several well-known fungicides in hot and cold climates is discussed. The russeting of apples by Cu fungicides in damp climates and the danger from karathane at high temps. and dodine at low ones are instanced.

Schmidt (H.). **Beitrag zur Prüfung der phytotoxischen Wirkungen von Pflanzenschutzmitteln.** [Contribution to the testing of the phytotoxic effects of plant protectants.]—*NachrBl. dtsch. PflSchDienst, Berl.*, N.F., **15**, 1, pp. 1–3, 2 fig., 1961. [Russ., Engl. summ.]

The author (Biol. Zentralanstalt, Berlin) recommends the use of a series of potted plants such as fuchsia and pelargonium, 10 -15 cm. high, 3 plants/protectant. To obtain adequate coverage, the plant is plunged upside down into the spray solution without wetting the soil, then laid on its side to drip. According to temp., phytotoxic effects [**40**, 204] are estimated after about 5 days in a glasshouse, wettability and residue formation also being noted.

Łęski (R.). **Toxicity of plant protection chemicals for humans and domestic animals, and principles of their application. I. Acute toxicity. II. Chronic**

toxicity.—*Postępy Nauk rol.*, **7**, 4, pp. 31–43; 5, pp. 95–112, 1960. [18 ref. *Chem. Abs.*, **55**, 12, col. 11745e, 1961.]

A literature review from the Inst. Sadownictwa, Skierniewice, Poland, of 20 toxic substances.

Richardson (L. T.) & Thorn (G. D.). **The interaction of thiram and spores of Glomerella cingulata Spauld. & Schrenk.**—*Canad. J. Bot.*, **39**, 3, pp. 531–540, 2 pl., 1 fig., 7 graphs, 1961. [17 ref.]

Further information is given from the Pesticide Res. Inst., Canada Dept Agric., London, Ont., on the reduction of thiram by *G. cingulata* spores [**40**, 204] which occurs in the external solution [cf. **33**, 754]. This fact is regarded as of fundamental importance with reference to the site of the mode of action of the fungicide. In the presence of Cu ions dimethyldithiocarbamate was lost from solution and fungitoxicity was increased. Spore exudates gradually dissolved a precipitate formed, with a resultant reversal of fungitoxicity. A new technique, in which a paper strip treated with a metal salt was placed at right angles to another treated with thiram or a dithiocarbamate on an agar sheet seeded with *G. cingulata*, supplied corroboration of the hypothesis involving the 2 Cu dimethyldithiocarbamate complexes in the bimodal dosage response of micro-organisms to dithiocarbamate toxicants.

Forsyth (F. R.) & Unwin (C. H.). **Fungicidal action as affected by interaction of nickel chloride, nabam, zineb, and zinc sulphate.**—*Canad. J. Bot.*, **39**, 3, pp. 519–530, 8 graphs, 1961. [12 ref.]

At the Pesticide Res. Inst., Canada Dept Agric., London, Ont., the effect of the chemical interaction of Ni chloride [cf. **39**, 565], nabam, zineb, and $ZnSO_4$ on the fungicidal activity of an aqueous solution of these chemicals was assessed by the slide germination and a 'microbeaker' method (which is described) using *Monilinia* [*Sclerotinia*] *fructigena*, *Alternaria solani*, *Puccinia recondita*, and *P. coronata* f.sp. *avenae* [**40**, 603].

All the fungicides were more effective against the 2 rusts; Ni ethylenebisdithiocarbamate was much less effective than the others. Ratios (w/w) of Ni chloride hexahydrate to zineb of about 1 and to nabam+$ZnSO_4$ of from 2·10 to 1 revealed an unfavourable effect on fungitoxic activity against the uredospores of *P. recondita*. The ratio expressing the greatest antagonism varied according to the test organism and whether or not tank-mix or wettable powder zineb was used. The formation of Ni ethylenebisdithiocarbamate in the aqueous solution and its small fungicidal activity are sufficient to explain these results. When carbamate fungicides are in solution with more than 1 metal cation one will replace the others to form the predominant salt, and if this is as insoluble as Ni ethylenebisdithiocarbamate fungicidal activity will be reduced.

Somers (E.). **The fungitoxicity of metal ions.**—*Ann. appl. Biol.*, **49**, 2, pp. 246–253, 2 graphs, 1961.

In further work [cf. **40**, 17] at Long Ashton Res. Sta. the author determined the *in vitro* fungistatic activity of some 24 metal cations against *Alternaria tenuis* and *Botrytis fabae*, the metal salts being tested in aqueous solution without added spore germination stimulant. The results are discussed in relation to the site of action of metal cations on the fungus cell.

Byrde (R. J. W.), Clifford (D. R.), & Woodcock (D.). **Fungicidal activity and chemical constitution. IX. The activity of 6-*n*-alkyl-8-hydroxyquinolines.**—*Ann. appl. Biol.*, **49**, 2, pp. 225–232, 6 graphs, 1961.

Further studies [cf. **38**, 663] at Long Ashton Res. Sta. to provide evidence for the role played by chemical structure, through chelation and lipoid solubility, in the fungistatic activity of 8-hydroxyquinoline [**37**, 640].

Grover (R. K.) & Moore (J. D.). **Adaptation of Sclerotinia fructicola and Sclerotinia laxa to higher concentrations of fungicides.**—*Phytopathology*, **51**, 6, pp. 399–401, 1961.

At Univ. Wis., Madison, *S. fructicola* developed temporary resistance to actidione (at a max. of 22·5 μg. ml.), dodine (45), and phaltan (62·5), and *S. laxa* to actidione (1·25) and phaltan (55) after continuous exposure of agar cultures to concs. progressively higher than those normally toxic. Some morphological changes were induced, but the adapted isolates reverted to the original types after a few generations on media lacking the fungicide [cf. **38**, 453].

Higson (Helen M.). **Triazine derivatives for use as fungicides.**—Brit. Patent 857,166, Dec. 29, 1960 (to 'Shell' Res. Ltd.).

The fungicidal activity of these compounds was determined against spores of *Alternaria brassicicola* on wallflower leaves, the lethal dose to 95% spores being at 400 p.p.m. Tests against *Phytophthora infestans* on tomato (at 0·1% by wt. of the reaction product), *Uromyces fabae* on broad bean (0·025%), and *Pythium debaryanum* on beet seed (8 g./kg.) are described.

Taylor (W. S.). **Stabilizing agents for Bordeaux mixture.**—U.S. Patent 2,962,416, Nov. 29, 1960 (to R. T. Vanderbilt Co., Inc.). [*Chem. Abs.*, **55**, 12, col. 11750c, 1961.]

The patent describes the use of a mixture of 3 parts of Bindarene flour, which contains 10% Ca lignosulphonate, 20% wood sugars (mostly xylose), and 10% inert material with 2 parts of blackstrap molasses as an effective stabilizer. The mixture Vanaj = 3 comprising a blend of 64·66% Ca lignosulphonate and 31% triton X-114 (an alkyl aryl polyether alc.) with sorbitol or molasses in various ratios was found to be effective when added to a 5–3·75–50 Bordeaux mixture.

Suhovecky (A. J.) & Santmyer (P. H.). **Cyanoalkyl isothiocyanates as fungicides and nematocides for soil treatment.** -U.S. Patent 2,972,561, Feb. 21, 1961 (to Monsanto Chemical Co.). [*Chem. Abs.*, **55**, 12, col. 11748g, 1961.]

Effective reduction of fungi and nematodes was achieved by applying to infested soil $NCCH_2CH_2NCS$, $MeCH(CN)CH_2NCS$, or $NCCH_2CH(Me)NCS$ at 1–30 p.p.m. The 1st named at 0·1–1 p.p.m. increased the percentage of healthy cotton and cucumber plants more considerably than ethyl thiocyanate. Various fungi, including *Verticillium alboatrum*, *Rhizoctonia* [*Corticium*] *solani*, *Sclerotium rolfsii*, *Phytophthora cinnamomi*, *Fusarium oxysporum*, *F.* [*bulbigenum* var.] *niveum*, *Sclerotinia sclerotiorum*, and *Pythium ultimum*, inoculated in agar containing 6·25 p.p.m. of any of the compounds named or 6-cyanohexyl isothiocyanate, were completely inhibited by at least one of the toxicants.

Barnes (G. L.) & Zerkel (R. S.). **Effectiveness of mixtures of pyridinethiol derivatives and PCNB(terraclor) for control of a complex of soil fungi.** —*Plant Dis. Reptr*, **45**, 6, pp. 426–431, 1961. [15 ref.]

At Okla State Univ. a controlled environment soil test [cf. **40**, 78] was used for determining the effectiveness of dust fungicides, singly or together, in soil. Preliminary evaluations of certain derivatives of 2-pyridinethiol,1-oxide (omadine) [cf. **37**, 479; **40**, 325] alone, and mixed with terraclor were completed in 1956–7. The test plants were cotton and cucumber. In general, for individual compounds, control of *Pythium* sp. > *Rhizoctonia* [*Corticium*] *solani* > *Fusarium oxysporum* f. *cucumerinum*. Terraclor was highly toxic to *C. solani*, only slightly so to the others. Some mixtures of omadine salts of metals with terraclor were more effective against the 3 fungi together than a terraclor-captan mixture used for comparison. Many mixtures were toxic to cotton and cucumber seedlings, but some of the more

effective ones only slightly so. Mixtures of terraclor with cupric omadine or Zn omadine were effective in field tests at co-operating stations [cf. **37**, 722].

Chaffin (W.). **Seed treatment for plant disease control.**—*Circ. Okla. agric. Exp. Sta.* 615, 12 pp., 13 fig., [? 1961].

Brief introductory notes are followed by a table of recommended seed treatments for 10 crops, including 3 types of cotton seed, with some additional suggestions regarding a few other diseases not controlled by seed treatment.

Courshee (R. J.). **Avoidance of drift from airborne sprayers.**—*Outlook on Agric.*, **3**, 2, pp. 76–80, 3 fig., 1 graph, 1961.

In this article from the Nat. Inst. of agric. Engineering, Silsoe, Beds., the theoretical and practical aspects involved are discussed. Use of a coarser spray, with avoidance of small drops by appropriate measures, together with the slower flying speeds possible with helicopters, aids reduction of drift over low growing crops, but there are a number of limitations in practice.

Gottlieb (D.), Carter (H. E.), Sloneker (J. H.), Wu (L.-C.), & Gaudy (Elizabeth). **Mechanisms of inhibition of fungi by filipin.**—*Phytopathology*, **51**, 5, pp. 321–330, 6 graphs, 1961. [15 ref.]

Further studies from Univ. Ill., Urbana [cf. **40**, 79], on the antagonistic effect of sterols on inhibition by filipin are presented in detail and discussed.

Dŷmovŷch (V. O.). Дія летких антибіотиків різних культур видів **Trichoderma** на фітопатогенні бактерії і гриби. [The action of volatile antibiotics from different cultures of *Trichoderma* spp. on phytopathogenic bacteria and fungi.] –*J. Microbiol., Kiev*, **22**, 6, pp. 32–38, 3 fig., 1960. [Russ. summ.]

The volatile fractions from cultures of *T. lignorum* [*T. viride*] and *T. koningii* [cf. **38**, 186], investigated at the Inst. Microbiol., Kiev, were inhibitory to *Pseudomonas andropogonis*, *P. tabacum*, *P.* [*Agrobacterium*] *tumefaciens*, *P. fluorescens*, *P. pisi*, *Xanthomonas phaseoli*, *Erwinia carotovora*, *Fusarium sporotrichiella*, *F. culmorum*, *F. oxysporum*, *Verticillium dahliae*, *Helminthosporium* sp., *Polyspora lini*, and *Botrytis cinerea*. Results varied according to the age of the culture, the characters of the test organism, the nutrient medium, etc. The most active volatile fractions were from 10-day cultures. Of the bacteria tested only *Pseudomonas pisi* was resistant. Growth of the fungi was sometimes depressed, sometimes inhibited.

Mŷkhaĭlovlina (Mme A. O.), V'yun (G. A.), & Dŷmovŷch (V. O.). Виділення і дослідження деяких речовин з міцелію штаму **Fusarium moniliforme 2801.** [The isolation and study of some substances from the mycelium of *Gibberella fujikuroi* str. 2801.]—*J. Microbiol. Kiev*, **23**, 2, pp. 31–33, 1 graph, 1961. [Russ. summ.]

At the Inst. organic Chemistry and the Inst. Microbiol., Ukrainian Acad. Sci., a fraction was isolated from the acidified mycelium extract [cf. **40**, 67] which was antibacterial to *Bacterium* [*Xanthomonas*] *malvacearum*, *B.* [*Pseudomonas*] *fluorescens*, *B. carotovorum* [*Erwinia carotovora*], *B.* [*X.*] *phaseoli*, *B. pisi*, and *B.* [*Agrobacterium*] *tumefaciens*. The diam. of the zone of inhibition was 20 mm., except for *P. fluorescens* (21) and *A. tumefaciens* (28) [cf. above].

Faivre-Amiot (A.) & Staron (T.). **Action in vitro d'un nouvel antibiotique antifongique extrait d'un actinomycète isolé du sol.** [Action *in vitro* of a new antifungal antibiotic extracted from an actinomycete isolated from the soil.]—*C.R. Acad. Sci., Paris*, **250**, pp. 2760–2761, 1960.

An account of some of the cultural and biochemical characters of the str. of *Streptomyces* sp. from which AE 56 [**40**, 79] was obtained, with a note on the spectrum of the antibiotic activity of the substance.

Belyakova (Mme L. A.) & Kozulina (Mme O. V.). **Book preservation in U.S.S.R. libraries.**—*UNESCO Bull. Libr.*, **15**, 4, pp. 198–202, 1961.

Some 60 spp. of fungi harmful to books [**40**, 518] were identified from the Lenin State Library by its Sci. Res. Lab., 19 of them being common. Paper was completely destroyed by *Monilia* [*Neurospora*] *sitophila*, *Sporotrichum polysporum*, *Stachybotrys atra*, *Haplographium fuligineum*, *Botryotrichum piluliferum*, and *Sporidesmium echinulatum*. Over 80% of binding damage was caused by *Aspergillus* spp., while *Trichoderma* spp. attack binding and paper, *T. lignorum* [*T. viride*] only pure cellulose paper, and *Sporotrichum* spp. only rag paper. All spp. attack mainly bindings and adjacent pages except *T. viride* which damages middle pages only.

Leather is more susceptible when oiled, but 1% paranitrophenol may be added to oil for mildew protection. Pentachlorophenol, oxydiphenyl, and their phenates also protect leather at concs. of 10–15%. Polymethyl acrylate emulsion, used as newsprint size and as an adhesive, is resistant but fails to protect paper, but Na carboxymethylate cellulose and methylolpolyamide, used in book restoration, increase resistance. Ethyl cellulose is fungistatic on leather, but urea is not, and spermacetic emulsion even lowers resistance. Parchment becomes more susceptible when treated with a 20% urea solution under high humidity.

Plant quarantine announcements.—*F.A.O. Plant Prot. Bull.*, **9**, 3, pp. 43–44, 1960.

Brazil. Ministerial Order of 27 Sept. 1960, published in the *Diario Oficial*, 1 Oct. 1960, modifies the requirements for the importation of potatoes and revokes Ministerial Orders No. 622 of 15 July 1955, No. 811 of 28 Aug. 1955, and No. 986 of 10 Nov. 1955 [**36**, 512].

Netherlands. Order No. J. 1721 of 12 Aug. 1960, published in the *Ned. Staatscourant* 155, 12 Aug. 1960, governs the importation of certain plant materials. A number of Orders replaced by it include the Importation of Strawberry Plants Order, 1958 [**37**, 644] and other orders re tulips (1958) and flower bulbs (1960).

Pflanzenschutzbestimmungen in Deutschland. Pflanzenschutzbestimmungen im Ausland. Pflanzenschutzbestimmungen in Deutschland. [Plant protection regulations in Germany . . . . . abroad . . . . . in Germany.]—*Amtl. PflSchBestimm.*, N.F., **15**, 1, pp. 1–36; 2, pp. 37–120, 1961.

These publications follow the usual lines [cf. **40**, 340].

Granhall (I.). **Plant protection co-operation in Europe.**—*Horticultura*, **15**, 5, pp. 92–93, 1961.

A brief review, with examples of the operations of the E[uropean] P[lant] P[rotection] O[rganization].

Herr (R. R.). **Control of diseases and insect pests of crop plants in the Soviet Union.**—*Plant Dis. Reptr*, **45**, 6, pp. 399–410, 6 fig., 1961. [18 ref.]

This critical review is based on recent Soviet literature and reports of the U.S. Dept Agric. According to an official 1955 estimate disease losses in the U.S.S.R. were 10% of field crops, 20% of vegetables, and 40% of fruit, while in 1960 total agricultural losses from diseases and pests were reckoned at 22% of total production. In 1956 180,000,000 roubles were spent on crop protection. Seedborne diseases, especially of cereals, are a major source of loss. Antibiotics have generally been found more effective against bacteria than fungi, but they are not produced specifically for control on a commercial scale, while no research on synthetic chemotherapeutants is known. Much attention has been given to studying antimicrobial substances from higher plants ('phytoncides') [**40**, 516 *et passim*].

Virus diseases appear to be present in 25% of elite seed potato plants; detection methods are poorly developed. Aerial spraying is increasing rapidly, while improved experimental models of normal spraying equipment are being used and developed.

In the field of biological control Soviet research is fairly extensive but the practical use of antagonistic micro-organisms to control certain diseases has still not been achieved. *Puccinia striiformis* causes heavy losses in commercial fields and even in nurseries. There is little research on pathogenic races, physiologic specialization having hitherto been largely neglected [**40**, 517]. Lack of sufficient testing of potato vars. in different localities and without nurseries designed for susceptibility tests has hampered progress against *Phytophthora infestans*. Disease forecasting is as yet little developed, but quarantine activities and methods compare favourably with those elsewhere.

Samson (R. W.). **Relative humidities as accumulated percent-days related to some Indiana plant disease problems.**—Abs. in *Proc. Ind. Acad. Sci.*, **69** (*1959*), p. 108, 1960.

At Purdue Univ. histograms were constructed from meteorological data for the summer months of 1915–59, recording R.H. as %-days, 1% R.H. for 1 day being 1%-day. The 1st 27 summers were below av. in humidity, and the subsequent 18 mostly above av. This increase was reflected in an increase in some vegetable diseases which resulted in the abandonment of tomato and muskmelon growing.

Charliers (N. J.). **Importanza dello zolfo nell' agricoltura.** [The importance of sulphur in agriculture.]—*Progr. agric.*, **7**, 5, pp. 589–603, 11 fig., 1961.

In this paper, read before the recent National Convention on Sulphur organized by the Ente Zolfi Italiani, the topics dealt with include: symptoms of S deficiency in plants; determination of S requirements of plants; toxicity, antagonism, and synergism; S and the soil; and S and the protection of plants (in the field or in storage) against plant and animal parasites.

Fries (N.). **The growth-promoting activity of some aliphatic aldehydes on fungi.**—*Svensk bot. Tidskr.*, **55**, 1, pp. 1–15, 2 fig., 3 graphs, 1961.

The substance of this contribution has been noticed [**40**, 25].

Whaley (J. W.) & Barnett (H. L.). **The nature of a new growth factor required by certain parasitic fungi.**—Abs. in *Proc. W. Va Acad. Sci.*, **31–32** (*1959–60*), p. 135, 1960.

The hyperparasites *Calcarisporium parasiticum* [cf. **39**, 10] and *Gonatobotrys simplex* require for saprophytic growth an apparently undescribed growth factor which has been partially purified from the mycelium of certain ascomycetes and fungi imperfecti. Some non-host fungi appear to excrete the factor into the medium, allowing growth of *G. simplex* round the edge of the colony. The factor is heat-stable and effective at very high dilutions.

Heinen (W.). **Über den enzymatischen Cutin-Abbau II. Mitteilung : Eigenschaften eines cutinolytischen Enzyms aus Penicillium spinulosum Thom.** [On enzymatic cutin breakdown. Part 2: Properties of a cutinolytic enzyme from *P. spinulosum*.]—*Acta bot. neerl.* **10**, 2, pp. 171–189, 1 diag., 7 graphs, 1961. [Engl. summ. 53 ref.]

At the bot. Inst., Univ. Nijmegen, Netherlands, a cutinolytic enzyme present in extracts of *P. spinulosum* was purified by treating the extract with protamine sulphate, followed by $(NH_4)_2SO_4$ to separate out disturbing enzymes. Cutin isolated from pistils was more strongly attacked by the enzyme than cutin from other parts of the plant.

Deshpande (K.). **Studies on the pectolytic enzyme system of Rhizoctonia solani Kühn. IV. Viscosity reducing enzymes.**—*Enzymologia*, **22**, 5, pp. 295–306, 8 graphs, 1960. [Germ. summ.]

In further studies at Imperial Coll., London [**40**, 403], culture filtrates of *R.* [*Corticium*] *solani* from damped-off swede seedlings were found to contain both polygalacturonase and depolymerase, the latter differing from other pectic enzymes. The results of dilution, heating, dialysis, precipitation, and salt addition on the effect of the viscosity-reducing enzymes on pectin and Na pectate are described. They suggest that depolymerase may either act differently on diverse substrates or be composed of 2 enzymes.

Wagner (Helga). **Stoffwechselphysiologische Untersuchungen an Colletotrichum atramentarium (B. et Br.) Taub. unter Berücksichtigung der Bildung des Welketoxines in vitro.** [Metabolic-physiological studies on *C. atramentarium* in relation to the formation of the wilt toxin *in vitro*.]—*Phytopath. Z.*, **41**, 2, pp. 105–126, 1 fig., 1 graph, 1961. [Engl. summ. 50 ref.]

At the Inst. für allgemeine Botanik, Friedrich Schiller Univ., Jena, Germany, chlorotic tomato leaves were more sensitive to the wilt toxin [**35**, 541] from nutrient culture solutions than healthy green leaves. It also wilted potato leaves. The toxic substances are stable during brief periods of boiling but destroyed by autoclaving. Toxicity corresponded to that of a 10^{-3} M solution of fusaric acid [**38**, 37], was noticeably higher than that of a 10^{-2} M solution of komplexon III, but similar to that of 10^{-3} M komplexon III+$FeCl_3$.

Kuć (J.) & Maxam (T.). **Factors influencing the fungitoxicity of phenolic compounds.**—Abs. in *Proc. Ind. Acad. Sci.*, **69** (*1959*), p. 107, 1960.

Further studies at Purdue Univ., Indiana [cf. **40**, 154], showed that the inhibition of *Helminthosporium carbonum* race 1 by chlorogenic and caffeic acids was dependent on the medium and the pH. Inhibition may be due to the formation of toxic phenol and quinone amino-acid addition products, and to the production of phenol oxidases.

Sloan (B. J.), Routien (J. B.), & Miller (Virginia P.). **Increased sporulation in fungi.**—*Mycologia*, **52** (*1960*), 1, pp. 47–63, 1 fig., 1961.

At the Microbiol. Res. Sta., C. Pfizer & Co., New York, 148 of 424 imperfect fungi and ascomycetes, asporogenous when grown on potato glucose, oatmeal, or malt agars, sporulated when grown on an alphacel salts medium supplemented with 5% coconut milk; 96 sporulated on alphacel + 1% tomato paste+1% oatmeal. Details are tabulated.

Jerebzoff (S.). **Action de la fraction 'non ionique' de l'extrait de malt et de quelques sucres sur le rythme endogène de zonation d'Alternaria tenuis Auct.** [Action of the 'non-ionic' fraction of malt extract and some sugars on the endogenous zonation rhythm of *A. tenuis*.]—*C.R. Acad. Sci., Paris*, **252**, 25, pp. 4034–4036, 1961.

In further studies [cf. **40**, 343] potato extract cultures in darkness at 23° C. supplemented with the 'non-ionic' fraction of malt extract or certain sugars, particularly glucose, maltose, mannose, and lactose, developed zonations specific for each sugar within definite conc. limits.

Bjornsson (Ida P.). **Responses of certain fungi, particularly Trichoderma sp., to light.**—*J. Wash. Acad. Sci.*, **49**, 9, pp. 317–323, 1 fig., 2 graphs, 1959. [24 ref.]

On potato dextrose agar at 21° C. at Univ. Md. light encouraged spore production [cf. **34**, 803; **40**, 519], mycelial growth and coloration, and medium coloration of a

yellow mycelial str. of *Stemphylium* sp.; spore production, ridging, and formation of sclerotia by *Botrytis gladiolorum*; spore production by *Curvularia trifolii*, *Penicillium gladioli*, and a dark mycelial str. of *S.* sp.; pycnidia formation by *Diplodia* sp.; basidiocarp formation by *Lenzites trabea*; sporangial formation by *Rhizopus* sp.; sclerotial formation by *Stromatinia* [*Sclerotinia*] *gladioli*; and the formation of sclerotium-like bodies by *Rhizoctonia carotae* [**28**, 107]. *Trichoderma* sp. formed spores in light (1 min. in white fluorescent light) only, their production increasing linearly with a logarithmic increase in intensity from 1·5 to 50 ft. candles. The peak of response lay at 4,300–4,900 A.

Hill (A. C.), Pack (M. R.), Treshow (M.), Downs (R. J.), & Transtrum (L. G.). **Plant injury induced by ozone.** —*Phytopathology*, **51**, 6, pp. 356–363, 1 col. pl. (6 fig.), 12 fig., 1961. [18 ref.]

At the Agric. Div., U.S. Steel Corp., Provo, Utah, 34 plant spp. were exposed in controlled atmosphere greenhouses to 0·13–0·72 p.p.m. ozone for 2-hr. periods [cf. **40**, 142, 342]. Of the 28 spp. developing symptoms, which are described, small grains, lucerne, spinach, and tobacco [**38**, 423] were the most sensitive. Sensitivity generally increased with tissue maturity, palisade cells being the most readily injured; symptoms were related to the siting of palisade and mesophyll. Marked tumours were induced on broccoli leaves.

Roll-Hansen (J.). **Some striking observations on the occurrence of fungi in steamed glasshouse soil.**—*Plant & Soil*, **14**, 2, pp. 197–198, 1 col. pl., 1961.

From the State Exp. Sta. Kvithamar, Stjordal, Norway, *Oedocephalum* sp., *Hyphelia terrestris*, *Pyronema*, and conidial *Plicaria fulva* [cf. **34**, 65] are recorded as appearing in large quantities on steamed soil of tomato beds where they may cause considerable damage by covering large areas, thereby suffocating young seedlings and cuttings. They can be controlled by captan.

Ward (E. W. B.) & Henry (A. W.). **Growth inhibition of two saprophytes and two plant parasitic soil fungi by antibiotics.**—*Canad. J. Bot.*, **39**, 3, pp. 491–495, 5 graphs, 1961.

At Univ. Alta, Edmonton, comparisons of the inhibition of the growth of *Trichoderma viride*, *Trichocladium asperum*, *Ophiobolus graminis*, and *Fomes annosus* on agar medium containing actidione, gliotoxin, griseofulvin, patulin, or trichothecin demonstrated that although both parasites tended to be more susceptible to antibiotic inhibition than the saprophytes the comparative responses at different concs. of the antibiotics were in many instances not proportionately related. Differential effects on organisms of the soil microflora are possibly influenced by any factors which affect the local conc. of an antibiotic, quite apart from its characteristic specificity. Either antibiotics are not always major factors in microbial competition, or root-inhabiting fungi do not always have less competitive saprophytic ability than those that are soil-inhabiting.

Rees (W. J.) & Sidrak (G. H.). **Inter-relationship of aluminium and manganese toxicities towards plants.**—*Plant & Soil*, **14**, 2, pp. 101–117, 8 fig., 4 graphs, 1961.

Spinach, barley, and *Atriplex hastata* were grown at the Bot. Dept, Univ. Birmingham, in water and sand culture with extra Al and Mn, singly and in combination. $Al_2(SO_4)_3$ caused a decrease in yield, a chlorosis and tip die-back in spinach and barley, and affected the growth of barley roots. Both plants were affected by $MnSO_4$, the older leaves developing chlorosis, and those of barley dark brown spots. The toxic effects of Al were correlated with its effect on the K/Ca balance of the plants and its possible effects on the protoplasm and cell walls. The

destructive effect of Mn was attributed mainly to the change in the Fe/Mn ratio and in part to the disturbed K/Ca ratio.

FOISTER (C. E.). **The economic plant diseases of Scotland : a survey and check list covering the years 1924–1957.**—*Tech. Bull. Dep. Agric. Scot.* 1, iv+209 pp., 2 graphs, 5 maps, 1961. 10*s*. [10 pp. ref.]

This publication amplifies previous lists [cf. **21**, 439]. Part I (pp. 4–86) attempts to assess as far as possible the distribution and economic importance of the more widespread diseases of major crops, including ornamentals and forest trees. Part II (pp. 87–159) is a list of the pathogens alphabetically under hosts, also in alphabetical order of scientific names. Differences in type distinguish important and less important hosts and parasites; popular names of hosts and diseases are given. In Part III are indexes of parasites, of virus diseases, of non-parasitic disease agents, and of common names of hosts. There are also 10 tables and a summary of Scottish certification schemes. There are 14 new records of viruses, and 89 of fungi and bacteria, as well as many new host records, some of which have already appeared in the literature. They include *Didymella lycopersici* on tomato [map 324], *Neofabraea perennans* and *Pezicula corticola* on apple, *Fabraea maculata* on quince, *Gnomonia fructicola* on strawberry, *Rhizina inflata* on Sitka spruce, Scots pine, and larch, *Pseudomonas syringae* f.sp. *populea* on poplar, and *Pseudobalsamia* [*Diehlomyces*] *microspora* and 5 other diseases on cultivated mushrooms.

ANNALIEV (S. A.). Новые материалы по микофлоре Туркмении. [New data on the mycoflora of Turkmenia.]—Изв. Акад. Наук Туркмен. ССР [*Izv. Akad. Nauk Turkmen. S.S.R.*], Ser. biol. Sci., *1960*, 4, pp. 25–34, 1960.

A list from the Dept of Lower Plants, Moscow State Univ., from a collecting expedition in 1958–9 in the Kara-Kala area [**40**, 287] of 186 forms and spp. previously unknown in Turkmenia, some being 1st records for the U.S.S.R. Included are *Coniothyrium* [*Coniella*] *diplodiella* [map 335] on vine stems and *Coniothyrium fuckelii* [*Leptosphaeria coniothyrium*: map 185] on *Centaurea squarrosa*.

KOMIRNAYA (Mme O. N.). Головневые грибы Юго-Востока. [Smut fungi of the South East.]—Учен. Зап. Саратов. Унив. [*Uchen. Zap. Saratov. Univ.*], *1959*, 64, pp. 105–107, 1959. [Abs. in *Referat. Zh. Biol.*, *1961*, 4, Sect. V, p. 8, 1961.]

A list of 79 spp. of smut fungi is presented, 44 of them parasitizing grasses, 19 recorded for the 1st time in the south east; *Ustilago bromi-erecti* [*U. hypodytes*] on *Bromus erectus* was new for the U.S.S.R.

HASSEBRAUK (K.). **Mykosen, verursacht durch Basidiomyceten.** [Mycoses caused by Basidiomycetes.] *Fortschr. Bot.*, **22**, pp. 435–442, 1960. [1½ pp. ref.]

A review from Brunswick, Germany, of recent outstanding literature (mostly 1958–9) on plant pathogenic Hymenomycetes, Uredinales [**39**, 220], and Ustilaginales.

MÜLLER (G.). **Die Hefen.** [The Yeasts.]—92 pp., 58 fig., 7 diag., Wittenberg Lutherstadt, A. Ziemsen, 1961. DM. 5.20.

This concise monograph gives up-to-date résumés of the structure and chemical composition of yeast cells, reproduction, occurrence, yeasts as pathogens, nutrition, cultured yeasts and their economic significance, classification, identification, genetics, and yeasts and vitamins. Though useful for scholarly reference, the publication is comprehensible to a laymen who is well-served by a list of definitions of technical terms (pp. 83–87).

Joly (S.). **Sôbre uma levedura preta isolada do Sapoti (Achras sapota I.). Observações comparativas com uma cepa de Pullularia pullulans (De Bary) Berkhout.** [On a black yeast isolated from Sapodilla. Comparative observations with a strain of *P. pullulans*.]—*Rev. Agric. Piracicaba*, **36**, 2, pp. 115–124, 8 fig., 1961.

The yeast was isolated from mature fruits. It differed from *P. pullulans* sufficiently to suggest that it is a new sp.

Bose (S. K.). **Studies on Massarina Sacc. and related genera.**—*Phytopath. Z.*, **41**, 2, pp. 151–213, 26 fig., 1961. [Germ. summ. 45 ref.]

This study from the Dept of Special Bot., Swiss Federal Inst. of Technology, Zürich, covers 19 *Massarina* spp., including 7 new ones, 11 *Keissleriella* (2 new), and 12 *Herpotrichia* (2 new). Keys are provided for the classification of the spp. on ascospore and ascocarp characters. Many spp. produced imperfect states in culture, all of the Sphaeropsidales. The 3 gen. form a natural group but do not justify the creation of a new family as they can be easily grouped within the Pleosporaceae.

Research techniques in use at the Grassland Research Institute, Hurley. –vi+167 pp., 16 pl.(28 fig.), 17 fig., Farnham Royal, Bucks., Commonwealth Agricultural Bureaux (*Bull. Commonw. Bur. Past. Field Crops* 45), 1961. 40*s*.

The 6 parts of this book, which plant pathologists would find a useful addition to their reference shelves, cover experimental design and interpretation, herbage plant investigations, animal investigations, plant/soil studies, extension trials, and special laboratory equipment and its use. In conclusion there is a 5-page bibliography and a short glossary.

Miller (C. W.). **A simple shade device.**—*Robigo, 1961*, 11. pp. 7–8, 1961. [Span. transl.]

This device to control greenhouse light and temp. was designed at Univ. Minn., St. Paul. A compartment cover is made by putting shredded paper between layers of cheesecloth; the number of layers can be varied to reduce light in the greenhouse to ½–1/20 of normal.

Salyaev (R. K.). Прибор для поверхностной стерилизации и высева семян. [An apparatus for surface sterilization and sowing of seed.]—*Bot. Zh. S.S.S.R.*, **46**, 5, pp. 670–672, 1 diag., 1961.

With this apparatus used at the Inst. For., Karelian Branch Acad. Sci. U.S.S.R., Petrozavodsk [cf. **38**, 468], sterilization, washing, and sowing of seed can be carried out in a single chamber. A reservoir containing sterilized water is connected *via* a T-piece to the chamber containing the seed, the sterilizing liquid being introduced through the other top arm of the T-piece. This and the washing water are controlled by 2 clamps. Through the outlet at the bottom of the chamber, controlled by a valve and a clamp, the treated, washed seeds can be manipulated singly under aseptic conditions on to an agar plate.

Treatment with 30% H_2O_2 for ½ min. gave 88% sterilized seed of *Pinus sylvestris*, but germination was considerably reduced. A 10 min. treatment increased sterilized seed to 94% without further decrease in germination.

Haskins (R. H.). **Freeze-drying of macrofungi for display.**—*Mycologia*, **52** (*1960*), 1, pp. 161–164, 5 fig., [1961].

A rapid method is described from Prairie Regional Lab., Saskatoon, Sask., Canada, by which sporophores brought in from the field are at once placed in a cold room at −30° C. and next morning put in a freeze-dryer. After 2–4 days they are removed and sprayed with several coats of clear acrylic plastic.

KOEHLER (J. K.). **Flat-embedding for electron microscopy of organisms grown on solid agar media.**—*Stain Tech.*, **36**, 2, pp. 94–95, 1961.

A simple adaptation of Howatson's method (*J. biophys. biochem. Cytol.*, **4**, pp. 115–118, 1958) allowing flat embedding of organisms grown on solid nutrient agar, developed at Donner Lab., Univ. Calif., Berkeley.

PAGE (O. T.). **Quantitative paper chromatographic techniques for the assay of products of polygalacturonase activity of fungus cultures.**—*Phytopathology*, **51**, 5, pp. 337–338, 1 fig., 1961.

A description from Central Res. Labs., United Fruit Co., Norwood, Mass., of a method used to assay polygalacturonase in microcultures of *Fusarium oxysporum* f. *cubense* by determining the amount of monogalacturonic acid liberated on hydrolysis.

KOCHMAN (J.) & STACHYRA (T.). **Materiały do poznania chorób wirusowych roślin w Polsce. Cz. II.** [Data for the recognition of virus diseases of plants in Poland. Part II.]—*Roczn. Nauk. rol.*, **81**, Ser. A, 2, pp. 287–301, 11 fig., 1960. [13 ref. Russ., Germ. summ.]

In this annotated list of 33 viroses of 29 plants from the Zakład Fitopatologii, SGG., Warsaw [cf. **37**, 340, 526], several are reported for the 1st time, including leaf veinbanding disease of red currant (*Ribes rubrum*); ring spot disease of horseradish (cabbage black ring spot virus), apple mosaic virus, band mosaic diseases of plum and peach (*Prunus* virus 10), lucerne mosaic virus, cineraria streak [? str. of tomato spotted wilt] virus, and some interesting viroses of trees are 1st records for the country.

KLESSER (PATRICIA J.). **The virus diseases of Crotalaria, Glycine, and Medicago species. The virus diseases of Beans.**—*Bothalia*, **7**, 3, pp. 497–519, 5pl. (20 fig.); pp. 521–558, 8 pl. (36 fig.), 1961. [59, 60 ref.]

In the 1st paper [cf. **39**, 682], following a review of the literature, descriptions are given of natural sources, physical properties, mode of experimental transmission, host range, reaction of susceptible spp., and identification of the virus diseases occurring naturally on *C. juncea*, *C. spectabilis*, soybean, *Glycine javanica*, and lucerne, mainly in the Transvaal but also in the Stellenbosch district of S. Africa, and near Salisbury, Southern Rhodesia.

On *C. juncea* 3 viruses were found: alsike clover mosaic virus 1 [alsike clover mosaic virus] and strs. of 2 bean viruses, described in the 2nd paper. On *C. spectabilis* 4 viruses occurred: the white clover mosaic virus (complex) [cf. **21**, 293], 2 bean viruses, and 1 related to broad bean mosaic virus [pea mottle virus]. Of these 7 viruses, none could be correlated with the *C.* viruses already reported in the literature. Clover mosaic virus and the white clover mosaic virus (complex) are recorded for the 1st time in S. Africa.

Field soybeans appeared to be susceptible to 3 viruses, including the seed-borne soybean mosaic, the others being strs. of bean chlorotic ring spot virus and bean local chlorosis virus. Symptoms of the last 2 viruses included mottling, puckering, and malformation of the leaves, and stunting of the plants.

Typical lucerne mosaic virus occurs naturally on lucerne in many parts of S. Africa; a variant was found in the Western Cape on lucerne, and another was isolated from *G. javanica* in experimental plots in Pretoria. The 1st variant, a necrotic str., is named lucerne mosaic virus necrotic str.; the host leaves were diffusely mottled and slightly malformed; the *Glycine* str., named accordingly, produced irregular, vivid yellow markings on most of the leaves, but no malformation.

In the 2nd paper the viruses considered include common bean mosaic virus [bean common mosaic virus] and a str. of it found on *Phaseolus vulgaris* var.

Canadian Wonder, also seed-borne, and with a wider host range than the type virus.

Four isolates of bean chlorotic ring spot viruses (A, B, C, and D) were isolated: from *C. juncea* (Pretoria district and Groblersdal), soybean (Pretoria and Bethal districts and Potchefstroom), *Voandzeia subterranea* (Pretoria and district), and *Erythrina caffra* (Pretoria). The 4 isolates differ from one another on other hosts, but are provisionally grouped together as strs. of 1 virus. Though there can be small doubt that they are related to the tobacco ring spot group, there is no complete correlation with strs. already described.

The characteristic feature of the bean local chlorosis viruses is a vivid chlorotic spotting on bean. This occurred with isolates from several hosts. In other respects the 7 isolates differed from one another. They are therefore considered to be strs. of 1 virus, linked by their common local reaction on bean (*P. vulgaris*); 2 of them differed slightly in systemic symptoms.

A virus found on naturally infected *C. spectabilis* caused very severe local and systemic necrosis on bean. A similar reaction on bean developed with isolates from *Dolichos lablab* and *G. javanica*, but on some other hosts these isolates differed. The virus was similar to but not completely identical with several others; meantime it is named bean necrosis virus.

When beans were inoculated with sap from naturally infected *P. vulgaris* and *C. spectabilis*, 2 distinct types of local lesion developed, (*a*) chlorotic spots or blotches and (*b*) necrotic specks. Two components were found, one causing a local chlorosis on bean, identified as bean local chlorosis virus A [cf. **39**, 682], the other causing small, local, necrotic lesions on bean, named bean necrotic speckle virus and probably related to the lucerne mosaic virus group.

Other viruses isolated were bean yellow mosaic virus, common on naturally infected *Lupinus albus* and *L. angustifolia* in the Western Province [loc. cit.], bean yellow mosaic virus, necrotic str. (found on naturally infected sweet pea in Pretoria and district), lupin virus B [loc. cit.], found on beans growing near *Lupinus* spp. in the Western Province, and pea wilt virus str. found in an experimental plot of Kentucky Wonder beans in the Rustenburg area; many plants bore vivid, yellow spots on the leaves, mottling, veinbanding, and puckering were also present, and the plants were stunted.

Lee (C.). **Biochemical studies of western ring spot virus.**—*Diss. Abstr.*, **21**, 10, p. 2880, 1961.

Studies at Ore. State Coll. indicated that western ring spot virus is intermediate between tobacco ring spot virus [cf. **40**, 160] and bean yellow mosaic virus [cf. **39**, 447]. It is biologically stable. A technique for the purification of the virus from infected bean [*Phaseolus vulgaris*] plants was developed. Crystallization occurred in aqueous solution at 5° C. within a week. Both crystals and fresh preparations of the virus induced local lesions on horse [broad] beans. Under the electron microscope both rod and spherical particles were visible, the relative distribution of each depending on the pH and the nature of the buffer salts used for extraction.

Kuhn (C. W.). **Concentration and specific infectivity changes of Alfalfa mosaic virus during systemic infection in Tobacco.**—*Diss. Abstr.*, **21**, 7, p. 1700, 1961.

At Purdue Univ., Lafayette, Ind., after an early non-detectable phase, there was a rapid rise in the lucerne mosaic virus growth curve [**38**, 249] followed by a rapid decline. This rise was paralleled by an increasing conc. of virus nucleoprotein shortly after inoculation. Influence of temp. on virus conc. and specific infectivity are discussed, as well as infectivity loss during purification of young and old virus.

Köhler (E.). **Über das Verhalten einiger Mosaikviren im geimpften Blatt im Anschluss an die Impfung. IV. Das Kartoffel-X-Virus auf dem Samsuntabak ;**

das Tabakmosaikvirus auf Nicotiana glutinosa und Nicotiana glauca. [On the behaviour of some mosaic viruses in the inoculated leaf in relation to inoculation. IV. Potato virus X in Samsun Tobacco; Tobacco mosaic virus in *N. glutinosa* and *N. glauca*.]—*Z. PflKrankh.*, **68**, 5, pp. 258–266, 4 graphs, 1961. [Engl. summ.]

In further studies [cf. **38**, 400] at Messeweg 11–12, Brunswick, Germany, the infectivity of saps from newly infected leaves was assayed as a function of time after inoculation. With potato virus X on Samsun tobacco the course of infectivity was materially the same as was formerly found for TMV on the same host [cf. **36**, 557]. The infectivity of saps of *N. glutinosa* inoculated with TMV showed a deviating course; in the initial stages a 'premaximum' appeared, which was considerably higher than the zero-time level and was influenced by temp. It is assumed that the virus is initially inactivated and then partially reactivated before it undergoes the ordinary denaturation. In the only experiment carried out with TMV on *N. glauca* the rapid regress of infectivity behind the 'main max.' was remarkable.

Weintraub (M.), Kemp (W. G.), & Ragetli (H. W. J.). **Some observations on hypersensitivity to plant viruses.** —*Phytopathology*, **51**, 5, pp. 290–293, 1 fig., 1961. [14 ref.]

At Vancouver, B.C., and St. Catherine's, Ont., grafting healthy clones of *Dianthus barbatus* normally hypersensitive to carnation mosaic virus [**31**, 491] to clones systemically infected by this virus, and healthy hypersensitive plants of *Nicotiana glutinosa* and Connecticut Havana 23 tobacco to Haronova tobacco systemically infected by tobacco mosaic virus consistently caused complete systemic infection of the hypersensitive plants. It appears that continuous application of a high level of inoculum to a hypersensitive host over a long period will always result in systemic invasion, a conclusion also reached by Walker [**33**, 271] and other workers cited.

Gol'din (M. I.). **Einfaches Universalverfahren zur virologischen Untersuchung von Pflanzen.** [Simple universal method for virologic examination of plants.] —*NachrBl. dtsch. PflSchDienst, Berl.*, N.F., **15**, 1, pp. 12–13, 1 fig., 1961.

At the Inst. for Microbiol., Moscow, slides of transparent plastic with a regular network of grooves carved into a certain length of the surface, in the middle of one slide and at the end of the other, were used in pairs to crush plant samples, the sap being allowed to run down the grooves. This ensures the even distribution of the drops either for serological reactions or for smearing leaves as a means of inoculation.

Augier de Montgremier [Hélène]. **Difficultés et perfectionnements de la méthode sérologique appliquée à l'étude des virus végétaux.** [Difficulties and improvements in the serological method applied to the study of plant viruses.] —*Rev. Path. gén.* 721, pp. 1331–1337, 1 graph, 1960. [Eng., Span. summ.]

Difficulties encountered in dark field microscopy used to reveal the flocculation of a virus in the presence of the specific antiserum are discussed. Interference of non-specific reactions may be reduced by adding $NaHSO_3$, KCN, or Na_2HPO_4. The immune serum should be diluted sufficiently to prevent interference by normal proteins from the host. With viruses such as potato virus A, difficult to extract from the host, unstable, and thermo-labile, an alumina immunization adjuvant may be useful. A new method of preparing polyvalent sera by mixing monovalent immune sera is described [cf. **38**, 332].

Hamilton (R. I.). **Studies on the properties of Brome mosaic virus and its related antigens.**—*Diss. Abstr.*, **21**, 7, p. 1699, 1961.

The fact that crude sap of barley and maize plants infected by brome mosaic virus

[**38**, 751; **40**, 597] yielded several antigen:antibody precipitation lines in the Ouchterlony serological test at Univ. Neb. suggested that it might be useful for studying virus multiplication, but when it was demonstrated that a monodisperse suspension of virus particles obtained by density-gradient centrifugation [**38**, 72] also showed several precipitation lines, it seemed that BMV might be undergoing some change in particle integrity under the serological test conditions used to determine the degree of homogeneity of an antigen preparation. The evidence obtained indicated that purified BMV is unstable under mild conditions, as the stability of crude and purified virus preparations decreased as pH was increased from pH 5 to 8, but materials in barley extracts stabilized the virus. Stabilization was undetectable at pH 5, but increased greatly at pH 6 to 8. Purified virus dissociated into subunits of uniform size, apparently non-infectious nucleoproteins.

THRESH (J. M.). **Some isolates of virus causing swollen-shoot disease of Cacao in Nigeria and their interrelationships.**—*Ann. appl. Biol.*, **49**, 2, pp. 340–346, 1 pl., 1961.

At the Nigerian Substat., W. Afr. Cocoa Res. Sta., Ibadan, many symptomatically distinct virus isolates were made from cacao trees with swollen shoot virus [cf. **40**, 670]. Of typical virus isolates from 6 different localities inoculated to beans, 2 caused swellings on seedling Amelonado as the only lasting symptom, while a 3rd caused only leaf chlorosis; the others caused both swellings and chloroses differing in type and severity. Two atypical, much less virulent isolates caused only transient, inconspicuous leaf symptoms. Isolates can be grouped according to their ability to protect; thus plant protection tests are critically important. Attempts to produce antisera have failed. It is suggested that the different groups are major sub-divisions of a single virus or virus complex.

BARCROFT (A. L.). **Annual Report of the Department of Agriculture, Federation of Malaya, for the year 1959.**—vii+101 pp., 12 fig., 1961. $2.50 (Malay).

From tests with *Botryodiplodia theobromae* and *Fusarium decemcellulare* [*Calonectria rigidiuscula*] mentioned in this report (p. 43) [cf. **39**, 656], it was concluded that die-back of cacao [**38**, 658] could be induced in plants grown under water stress or in sand culture minus Ca and that these 2 fungi, associated with the condition, were not pathogenic. Black pod (*Phytophthora* [*palmivora*]) of cacao is reported for the 1st time in Malaya, at the Fed. Exp. Sta., Serdang.

KOBEL (F.). **Die Gelbverzwergung, eine Viruskrankheit des Getreides in der Schweiz.** [Yellow dwarf, a virus disease of cereals in Switzerland.]—*Mitt. Schweiz. Landw.*, **9**, 3, pp. 42–47, 3 fig., 1961.

Barley yellow dwarf [**40**, 603] was 1st found in Switzerland on barley at Ernen, Valais, in 1956, this being its 1st record in Swiss literature, and on oats near Zürich. *Rhopalosiphum padi* infects wheat naturally in the field. It is believed that the virus can persist in grasses for years; from them it is carried by aphids to cereals in summer but does little damage. It is presumably carried from low areas to the Alps by windborne aphids to infect cereals still green higher up.

GERECHTER (Z. K.), LEVINE (M. N.), MINZ (G.), SCHREITER (S.), & WAHL (I.). **Parasitic specialization of the major cereal rusts in the State of Israel.**—*Robigo, 1961*, 11, pp. 15–20, 1961. [Span. transl.]

At the Nat. and Univ. Inst. of Agric., Rehovoth, by 1956 20 races of *Puccinia graminis* [f. sp.] *tritici* had been isolated from wheat; 14 and 56 were the commonest, representing ⅓ of the isolates. During 1956–59 infected cereal collections yielded 12 races; all except 11, 14, 17, and 34 were new. The commonest were 14 (44%), 21 (23·2%), and 17 (12·5%). Of 9 races of *P. recondita* [f. sp.] *tritici* isolated, the commonest were 26 (58·5%), 107 (17%), and 20 (13·2%).

During 1926–55, races 1, 2, 6, 7, and 8 of *P. g.* [f. sp.] *avenae* were discovered on oats; 6 constituted 68% of isolates, 8, 18·6%, and 2, 8·6%. During the 1956–59 survey for *P. coronata* [f. sp.] *avenae* [**39**, 695], the commonest races were 286 (12·1%) and 270 (11·2%) and groups 263–264–276 (40·2%) and 202–203 (13·1%).

GUTHRIE (E. J.). **Races of Puccinia graminis tritici and Puccinia graminis avenae in Kenya.**—*Robigo, 1961*, 11, pp. 5–7, 1961. [Span. transl.]

A table of the races identified on wheat and oats found in Kenya is presented from the Plant Breeding Sta., Njoro, Kenya, and a more detailed account is promised. The races on wheat are: 11, 14, 21 (Kenya 12), 24 (? K 8), 34 (? K 3), 40 (K 16, 17, and 18, subraces), 42 (K 13), ? 122 (? K 9), possibly new, 143 (K 14), 184, and 189 (K 19); 17 (K 2) is suspected. Those on oats are 6, 6A, 13A, and a possible new race.

STEWART (D. M.), COTTER (R. U.), & CHRISTENSEN (J. J.). **Physiologic races of Puccinia graminis in the United States in 1960.**—*Plant Dis. Reptr*, **45**, 6, pp. 448–453, 2 graphs, 1961.

Among 14 races identified on wheat at Minn. agric. Exp. Sta. [**38**, 736] race 56 comprised 67% of 721 uredial isolates; race 15 B 17%, 27% being in the spring wheat region where it was the commonest, 2 of its groups attacking Selkirk; some isolates of race 11 (7%) were virulent on Bowie and on Frontana lines.

On oats races 6 and 7 each formed 23% of 130 isolates, this being the 1st year in which race 7 has been equalled in prevalence. Races 2 and 5 comprised 20%, races 8 and 10, 14%, race 7A, 11%, other races 9%. The virulent race 6A was found for the 1st time in the U.S.A. (Maine, Ill., and N.Y.), while 2 new races, tentatively called 2A and 5B, attack oats having the so-called Canadian type of resistance.

HAUNOLD (E.). **Untersuchungen über das Auftreten physiologischer Rassen des Weizenschwarzrostes (Puccinia graminis tritici Erikss. et Henn.) in Österreich im Jahre 1959.** [Studies on the occurrence of physiologic races of Wheat black rust (*P. g. tritici*) in Austria in the year 1959.]—*Z. PflKrankh.*, **68**, 3, pp. 145–154, 1961. [Engl. summ.]

Investigations at the Bundesanstalt für Pflanzenschutz, Vienna, showed that in addition to races already recorded [**34**, 217] 11, 14, 18, 19, 35, 75, 122, 186, and 189 occur in Austria. Race 14 (20·69% of the isolates) was the most widely distributed, followed by 11 (17·24%), and 21 (12·07%). Race 189 attacked all the differentials severely; next in virulence came 15. Barberry seems to play an active part in the occurrence of races in Austria, but spores may also be carried in from neighbouring and more distant countries. Infection is heavy in the Klagenfurt basin, less serious in the vicinity of Melk. Of the 19 wheat vars. inoculated in the greenhouse none was resistant to race 11, but Achleitner 106, Drauhofener Kolben, Erla Kolben, Dr. Lasser's Dickkopf, Primus St 1081, Reichersberger Kolben, and Triumf showed good resistance to 14 and 21.

ŠPEHAR (V.). **Preliminary communication about the resistance of Italian Wheat sorts to stem rust (Puccinia graminis tritici) in the territories of Western Yugoslavia.**—*Robigo, 1961*, 11, pp. 10–14, 1961. [Span. transl.]

At Zavod Za Ratarstvo, Zagreb, seedling stage tests with a population of 10 races [**40**, 293] and various mixtures of them, including 21, the commonest in W. Yugoslavia, showed that genetically the Italian wheat vars. [**39**, 565] are susceptible to 21 and 75, a degree of resistance being shown only by the Elia, but 15 vars. were resistant to race 14. In mixed population tests all vars. except Elia and Clavatino were susceptible.

Ellingboe (A. H.). **Somatic recombination in Puccinia graminis var. tritici.**—*Phytopathology*, **51**, 1, pp. 13–15, 1961.

At the Inst. Agric., Univ. Minn., St. Paul, several recombinants [**39**, 17], identified by colour and pathogenicity, were obtained when uredospores of *P. graminis* culture 111 were mixed with those of 6 other cultures in a light mineral oil and sprayed on to wheat seedlings (vars. Reliance, Arnautka, Spelmar, and Bowie) with a micro-atomizer. The var. inoculated appeared to have a selective effect on the recombinants recovered.

The results suggested that pathogenicity on several of the host vars. is controlled by more than 1 gene locus.

Knott (D. R.). **The inheritance of rust resistance. VI. The transfer of stem rust resistance from Agropyron elongatum to common Wheat.**—*Canad. J. Pl. Sci.*, **41**, 1, pp. 109–123, 1 pl.(8 fig.), 1961. [14 ref.]

Further work at the Univ. Sask. [cf. **39**, 97] showed resistance to *Puccinia graminis* [f.sp.] *tritici* [**40**, 216] of a 56-chromosome wheat × *A.* derivative to be controlled by a gene (or genes) on a single *A.* chromosome. Resistant wheat plants with 21_{II} wheat chromosomes were produced with a single added *A.* chromosome and irradiated (spikes with γ-rays or X-rays and seeds with thermal neutrons). In 5 lines a piece of the *A.* chromosome bearing rust resistance was transferred to a wheat chromosome, and the subsequent translocation of 1 of these so transmitted was normal.

Leathers (C. R.). **Comparative survival of rehydrated and nonrehydrated Wheat stem rust uredospores on dry leaf surfaces.**—*Phytopathology*, **51**, 6, pp. 410–411, 1 graph, 1961.

At Ariz. State Univ., Tempe, germinability of freshly collected *Puccinia graminis* uredospores, rehydrated in a saturated atmosphere for 24 hr. and then dusted on wheat leaves, was 80–90% for the next $2\frac{1}{2}$ weeks and 70–80% for a further 3 weeks, whereas that of non-rehydrated spores was 70–80% for 2 weeks and then declined rapidly to a very low level. The Baart seedlings used were held (with subirrigation) at 75° F. and 40% R.H. and exposed at intervals to dew, at 75° for 2 hr., to permit spore germination. It is postulated that an endogenous inhibitor of germination may be removed by rehydration.

Overlaet (J.). **Physiologic races of Wheat leaf rust (Puccinia recondita Rob.—Puccinia triticina Erikss.) occurring in Belgium in 1958.**—*Robigo, 1961*, 11, pp. 8–10, 1961. [Span. transl.]

At the Veredelingssta., Heverlee, Belgium, 15 races of *P. recondita* were identified, the commonest being 11, 14, and 107, representing 22, 23, and 21% of the uredial collections, respectively [cf. **40**, 527].

The North American 1961 set of supplemental differential Wheat varieties for leaf rust race identification. *Plant Dis. Reptr*, **45**, 6, pp. 444 446, 1961.

The committee of research workers responsible [**38**, 589; **40** 353] have found that at least 4 wheat vars. (Lee, Westar, Sinvalocho, and Waban) of the original 16 will differentiate *Puccinia recondita* cultures carrying genes for virulence important in N. America not differentiated on the 8 standard differentials; these 4 will be designated 'NA 61 -'. The remaining 12 test vars. of 1959 were grouped into 4 universally resistant, 5 of potential supplementary use, and 3 dropped as useless for further testing; these 3 groups are listed. A key using the NA 61 set of supplemental differential vars. is presented, in which only 2 categories of reaction classes, resistant and susceptible, are recorded.

Vakili (N. G.) & Caldwell (R. M.). **Genetics of pathogenicity in race 104 Ind.B of Wheat leaf rust.**—Abs. in *Proc. Ind. Acad. Sci.*, **68** (*1958*), pp. 88–89, 1959.

Progenies of teleutospores of single-spore isolates of race 104 Ind.B of wheat leaf rust [*Puccinia recondita*: cf. **38**, 737] segregated for virulence on all vars. tested except two. This indicated heterozygocity in the parental race. Its genotype could therefore be considered similar to that of any F_1 wherein the S_1 progenies would give results similar to those of F_2 progenies. Avirulences of S_1 progenies [loc. cit.] to Newsar (C.I. 12530), Waban (C.I. 12992), and Wardal 2 (Purdue 4665AZ-14–4) were governed by dominant factors A_H1, A_{Wa}, and A_M2, respectively; and to Carina, Webster, and Hussar by complementary pairs of factors, A_c and A_M2, $A_{We}1$ and $A_{We}2$, and A_H1 and A_H2, respectively. Uredospore colour is monogenically inherited. The range of virulence varied from wide (uredo progenies), such as in race 77, to narrow, as in race 1. Some of the progenies were able to attack Wardal 2, which had been highly resistant to all cultures of the rust obtained from nature.

Schafer (H. F.), Caldwell (R. M.), Patterson (F. L.), & Compton (L. E.). **Combination of resistance to Wheat leaf rust.**—Abs. in *Proc. Ind. Acad. Sci.*, **68** (*1958*), p. 89, 1959.

A technique was devised at Purdue Univ., Ind., for incorporating into a genetic stock several genes resistant to *Puccinia recondita* [cf. above], each with a comprehensive race coverage. Aniversario, Exchange, Frontana, and La Prevision 25, each with a broad coverage, were crossed in 5 of the 6 paired combinations. Limited sporulation occurred in some instances. Uniformly resistant selections with a higher resistance reaction than either parent were obtained from all 5 crosses tested. After backcrossing such a selection from each hybrid to both parents, in no instance did susceptible progeny appear in the F_2.

Peresypkin (V. F.) & Gotsulyak (V. D.). Залежність між вмістом калію в листках озимої Пшениці і стійкістю окремих сортів проти бурої іржі. [The correlation between the K content of leaves of winter Wheat and resistance to brown rust in different vars.]—Допов. Укр. Акад. сіл.-гос. Наук [*Dopov. Ukr. Akad. sil.-hos. Nauk*], **3**, 2, pp. 29–32, 4 graphs, 1960. [Russ. summ.]

At the Ukrainian sci. Res. Inst. for Plant Prot. a direct correlation was established between K content of the leaves and resistance to *Puccinia triticina* [*P. recondita*: **40**, 602] in the resistant winter wheat Belotserkovskiĭ 198 and the susceptible Erythrospermum 15. In the resistant var. there was a higher percentage of K in the leaves throughout the season 1957–8 and it was always higher when infection appeared in the autumn (Oct.) and during the large-scale leaf infection at the beginning of the milk stage (end of June). It increased in the leaves in the initial stage of infection, which is evidently connected with the reaction of the plant to the penetration of the pathogen.

Zadoks (J. C.). **Yellow rust on Wheat: studies in epidemiology and physiologic specialization.**—*Tijdschr. PlZiekt.*, **67**, 3, pp. 69–256, 1 diag., 32 graphs, 7 maps, 1961. [Dutch summ. (4 pp.). 132 ref.]

This comprehensive report (1956–60) on *Puccinia striiformis* [**40**, 526] on wheat in N.W. Europe opens with prefatory notes on rust research in the Netherlands and European co-operation with regard to it. The introduction (pp. 75–95) covers ecological aspects and wheat cultivation in general and describes the rust, the handling of it for experimental purposes, and international trials. Part 2, 'Physiologic specialization and epidemiology' (pp. 95–159) covers the rust on grasses, races and their field study, and genetics. Part 3, 'qualitative epidemiology' (pp. 159–186), is concerned with incubation periods, overwintering and spread through the

summer, and the effect of weather. Part 4, 'quantitative epidemiology' (pp. 187–207) deals with the graphic representation of the development of the rust population and mathematical aspects involved. [Also published as *Meded. Lab. Phytopath., Wageningen*, 193 and *Meded. Inst. PlZiekt. Onderz., Wageningen*, 256, 1961.]

Kostić (B.). **Increased occurrence of stripe rust in Southeastern Yugoslavia in 1960.** —*Robigo, 1961*, 11, pp. 1–5, 1961. [Span. transl.]

Puccinia glumarum [*P. striiformis*: **40**, 35] is rare in this region, its distribution being governed by climatic conditions, but in 1960 it was widespread at Kragujevać, Priština, and Peć, according to this report from the Kragujevać agric. Res. Inst. A cool, wet May promoted this unusual infection, but a warm June checked it. Local wheat vars. possess no field resistance to this rust.

Kaul (T. N.). **Experiments on the control of bunt of Wheat in Kashmir.**—*Sci. & Cult.*, **27**, 4, pp. 201–202, 1961.

In experiments by the Mycol. Sect., Agric. Res. Sta., Lalmandi, Srinagar, at departmental farms in infested localities, a local susceptible wheat var. was used in 3 successive seasons, 1955–58. The seeds were inoculated with spores (6 g./kg. seed) from ears infected by *Tilletia caries* [cf. **38**, 403]. All fungicidal treatments were effective, the recommended ones being ceresan at 4 and 5 oz./112 lb., and agrosan GN 3 at 5 and 4·5 oz./112 lb. which reduced infection to under 0·75% compared with 63·6–68·7% for untreated.

Caldwell (R. M.). **Culture of powdery mildew (Erysiphe graminis DC.) on excised Wheat leaves in solutions of benzimidazol.**—Abs. in *Proc. Ind. Acad. Sci.*, **69** (*1959*), p. 109, 1960.

At Purdue Univ. 2 races of *E. graminis* have been cultured through 9 transfers on detached wheat leaves floating in distilled water with 40 or 60 p.p.m. benzimidazole. The reactions of the 2 wheat vars. used were unchanged, and the fungus sporulated profusely at 60–75° F., providing inoculum for experiments.

Sprague (R.), Fischer (W. R.), & Figaro (Peggybeth). **Another sclerotial disease of winter Wheat in Washington.**—*Phytopathology*, **51**, 5, pp. 334–336, 4 fig., 1961.

An account from Wash. State Univ., Wenatchee Exp. Sta., of the finding of *Sclerotinia borealis* [cf. **35**, 300; **39**, 27] on winter wheat, *Phleum pratense*, and *Bromus tectorum* in Okanogan County, Wash., associated with *Typhula* spp., *Fusarium nivale* [*Calonectria nivalis*], and *Rhizoctonia* sp. The area is subject to fairly deep and prolonged snows. Cultural and field studies indicated that *S. graminearum* should be considered a synonym of *S. borealis*.

Scharif (G.). **Corynebacterium iranicum sp. nov. on Wheat (Triticum vulgare L.) in Iran, and a comparative study of it with C. tritici and C. rathayi.**—*Ent. Phytopath. appl., Téhran.* 19, pp. 1–24, 14 fig., 1961. [Pers. transl.]

Diseased wheat ears collected by the Azerbaijan agric. Sta. and studied at the Bacteriol. Lab., Imperial Coll., London, appeared almost normal at first sight, but spikelets were olivaceous instead of the usual yellow, and were stuck together by a honey-yellow slimy secretion. On dissection small abortive ovaries filled by the same type of slime were found instead of the normal grain.

A bacterium isolated produced lemon yellow colonies. It had the characters of *Corynebacterium*, but differed in many respects from *C. agropyri*, *C. rathayi*, and *C. tritici*, especially in gelatin liquefaction and sugar broth reactions. It also differed from the 1st in Gram staining and reduction of nitrates, and from the other

2 in starch hydrolysis. It is considered as new, named *C. iranicum*, and described, symptoms being the secretion of a yellow bacterial slime from the wheat ovaries and abortion of the grain.

C. rathayi and *C. tritici* as studied differed from Sabet's description [**34**, 633] in milk reaction, nitrate reduction, and in being non-motile.

Laidlaw (W. M. R.). **Extracting Barley embryos for loose smut examination.**—*Plant Path.*, **10**, 2, pp. 63–65, 1 pl.(4 fig.), 1961.

Two modifications of Russell and Popp's method of preparing barley embryos for examination for loose smut (*Ustilago nuda*) [**31**, 485], designed to expedite the process, have been used at Dept Agric., East Craigs, Scotland. In the 1st the grain is soaked in cold 5% NaOH [cf. **40**, 529] overnight and the embryos removed by agitation in hot water in an apparatus which is described. Before the embryos are removed from the last of a graded series of wire-mesh sieves the set is washed down with water. The sample is then dehydrated in alcohol and any chaff or endosperm removed by adding lactophenol solution to the embryos in a filter funnel, when the chaff sinks and can be run off. This process is repeated until all the debris is removed. Finally, the embryos are boiled in a fresh portion of lactophenol and are then ready for examination.

In the 2nd method, also described in detail, the seed is dehulled in H_2SO_4, and the endosperm dissolved in hot water after treatment in NaOH. The embryos are cleared in lactic acid and stained in trypan blue. The examination of large numbers of embryos is facilitated by using a transparent plastic slide machined out of perspex sheet 0·2 in. thick and having grooves 0·1 in. deep into which the embryos are run; they are then covered with lactophenol or lactic acid and examined with a stereoscopic binocular microscope. A practised worker using a hand tally counter can examine 1,000 embryos by this method in 30 min.

Schweizer (H.). **Stofftransport und -verteilung in Gerstensaatgut und -keimlingen als besonderes Problem bei der Flugbrandbekämpfung mit Antibiotica.** [Translocation and distribution of substances in Barley seed and seedlings as a special problem in the control of loose smut by antibiotics.]—*Phytopath. Z.*, **41**, 2, pp. 127–144, 2 fig., 1961. [Engl. summ. 38 ref.]

At the Inst. für Phytopathologie, Aschersleben, Germany, no complete control of barley loose smut (*Ustilago nuda*) was achieved by seed dressing with fungicidin or with antibiotics present in culture filtrates of *Streptomyces* strs. The absorption of the antibiotics [**37**, 759] by the seed and their translocation occurred to the greatest extent in the winter var. Mahndorfer during the swelling and sprouting of the seed. Seedlings that absorbed antibiotic through their roots transported it mainly to the leaf tips; very little reached the growing region at the base of the shoot where the mycelium of the smut fungus is found. There was no indication that treatment of seed or seedlings with culture filtrates containing antibiotics, or with pure fungicidin, led to any indirect effect on the smut through the metabolism of the host. Heat treatment (45° C.) at all stages of germination gave good control. The best results with fungicidin were obtained from application to the resting seed. With increasing age of the seedling at the time of application success diminished.

Hirata (K.). **Observations on the development of young colonies of Barley powdery mildew (Erysiphe graminis hordei Marchal).**—*Trans. mycol. Soc. Japan*, **2**, 3, pp. 2–6, 6 fig., 1960. [Jap.]

In further studies at Niigata Univ. [cf. **39**, 226] the development of colonies of *E. graminis* [f. sp.] *hordei* on resistant barley vars. is described in relation to haustorial development, mycelial growth, and the translocation of nutriment in the

mycelium. Mycelial development on resistant barley vars. over short periods is also considered.

Dyck (P. L.) & Schaller (C. W.). **Inheritance of resistance in Barley to several physiologic races of the scald fungus. Association of two genes for scald resistance with a specific Barley chromosome.**—*Canad. J. Genet. Cytol.*, **3**, 2, pp. 153–164; pp. 165–169, 1961.

At the Dept Agron., Davis, Calif., 5 genes, all dominant, were identified in connexion with resistance to *Rhynchosporium secalis* [cf. **40**, 297]. Atlas and Atlas 46 carried Rh2 conditioning type 1 reaction to race U.S. 1 [**39**, 165] and type 2 reaction to U.S. 7. The latter var., also Turk and possibly Brier, possessed Rh3, conditioning type 0 reaction to U.S. 1, U.S. 7, and U.S. 8. Rh4, conditioning the same reaction to these races and also to U.S. 9, was present in La Mesita, Trebi, and Osiris and was closely linked with Rh3. An allele $Rh4^2$ at the Rh4 locus was present in Modoc and conferred type 0 reaction to U.S. 8 and 9, type 1 reaction to U.S. 1, and type 2 reaction to 7. Turk also possessed an independent gene Rh5 giving type 2 reaction to U.S. 8.

Crosses of Atlas 46 with 7 interchange stocks showed that Rh3 was linked with spike density and streaked seedling characters, while Rh4 was associated with xantha seedling character.

Smith (H. C.). **Susceptibility of Saia and Fulghum Oat varieties to some strains of Barley yellow dwarf virus.**—*Canad. Pl. Dis. Surv.*, **41**, 3, pp. 178–181, 1961.

At Plant Res. Inst., Ottawa, Ont., V 5 isolate of the virus from Slykhuis [**39**, 165], MGV [**40**, 219] transmitted efficiently by *Macrosiphum avenae* but less so by *Rhopalosiphum padi*, and RPV, the reverse [cf. **39**, 166], were used to test the resistance of 6 vars. of oats. The tabulated results show that the vars. Saia C.I. 186606 and Fulghum C.I. 3067, considered resistant in Ill., were fairly susceptible to 1 str. of the virus, and that str. V 5 reacted differently from MGV and RPV on Clintland 60 and Californian Red.

Green (G. J.), Johnson (T.), & Welsh (J. N.). **Physiologic specialization in Oat stem rust in Canada from 1944 to 1959.**—*Canad. J. Pl. Sci.*, **41**, 1, pp. 153–165, 1 pl. (3 fig.), 1 graph, 1961. [18 ref.]

Surveys conducted annually from the Canada Dept Agric., Winnipeg, Man., showed that in 1921–44 races 1, 2, and 5 of *Puccinia graminis* f.sp. *avenae* [**38**, 140; **40**, 298, 603] predominated; in 1945–52 races 8, 10, and 11; and in 1953–59 races 3, 7, and 12. Race 7A, which is virulent on Rodney, is increasing; 6A, 8A, 11A, and 13A, virulent on Garry and Rodney, are present in E. Ont. and Que. Race 6A is virulent on vars. with the resistant genes A, BC, D, and E, but sources of resistance to the new races have been found and C.I. 4023 has shown outstanding resistance to them.

Welsh (J. N.), Green (G. J.), & McKenzie (R. I. H.). **New genes for resistance to races of Oat stem rust.**—*Canad. J. Bot.*, **39**, 3, pp. 513–518, 1 pl., 1961.

In an investigation at Canada Dept Agric., Res. Sta., Winnipeg, of the inheritance in oats of reaction to some new and some well-known races of *Puccinia graminis* f.sp. *avenae* [cf. above] the resistance of var. Jostrain to races 1, 3, 4, 13, and 13A was found to be conferred by a single gene, designated as *E*. Canuck, a derivative of Jostrain, carries *E* and the previously identified *B* gene. The resistance of R.L. 524.1 to all races is conferred by 2 major genes and a modifying one. One of the major genes acts like *B*, which confers resistance to all races except 6A, 7A, 8A, and 13A. The other appears to be a new gene in oats for resistance to stem rust and is designated *F*. It confers resistance to all races, but for resistance to race 7 it requires a modifying gene along with it.

Theis (T.), Murphy (H. C.), Simons (M. D.), Calpouzos (L.), McVey (D. V.), & Porter (F. M.). **Oat varieties with adult-plant field resistance to race 264 of the crown rust fungus.**—*Phytopathology*, **51**, 5, pp. 303–305, 1961.

More details of tests with *Puccinia coronata* [**40**, 220].

Zimmer (D. E.), Schafer (J. F.), & Gries (G. A.). **Studies on teliospore formation and germination in Puccinia coronata.**—Abs. in *Proc. Ind. Acad. Sci.*, **69** (*1959*), pp. 107–108, 1960.

The rate of telial development [on oats] of 8 single-uredospore cultures of *P. coronata* of 6 races studied at Purdue Univ. was not correlated with virulence, host resistance, or host maturity. Development was directly affected by temp. Germination of greenhouse-produced teleutospores could not be induced, though field spores naturally overwintered in the field germinated readily.

Kondo (W. T.). **Effect of storage temperatures on the viability of lyophilized Ustilago avenae teliospores.** *Phytopathology*, **51**, 6, p. 407, 1961.

At Wash. agric. Exp. Sta. the percentage germination of lyophilized spores [cf. **36**, 388] was significantly higher ($P < 0{\cdot}05$) after 1 yr. at 5° and −15° C. than immediately after lyophilization and approached that of fresh, non-lyophilized spores, though these became almost totally non-viable after 1 yr. at room temp. Storage of lyophilized spores at room temp. was much less effective.

Ivanoff (S. S.) & Blount (C. L.). **The leaf blotch disease of Oats and its control.**—*Bull. Miss. agric. Exp. Sta.* 602, 8 pp., 6 fig., 1960.

A description of the disease (*Helminthosporium* [*Pyrenophora*] *avenae*) [**40**, 101 *et passim*] as it occurs in Miss. and notes on its control by seed treatment (ceresan M, $\frac{1}{2}$ oz./bush., or $\frac{3}{4}$ oz. panogen).

Nelson (R. R.) & Ullstrup (A. J.). **The inheritance of pathogenicity in Cochliobolus carbonum.**—*Phytopathology*, **51**, 1, pp. 1–2, 1 fig., 1961.

Further studies at N. Carol. State Coll., Raleigh [**40**, 210], showed pathogenicity to maize in *C.* [*Helminthosporium*] *carbonum* to be controlled by a gene independent of that for compatibility. All isolates from crosses of race 1 × race 1 were race 1, and from 2 × 2 were race 2. Of 400 isolates from 1 × 2 crosses, 203 were race 1 and the remainder race 2. Nearly all wild-type isolates in compatibility group A are race 1, and in group a are race 2. This disease would seem suitable for studies on the nature of resistance and pathogenicity.

Sudia (T. W.), Wood (F. A.), & Wilcoxson (R. D.). **Some effects of alpha irradiation on Gibberella fujikuroi.**—*Phytopathology*, **51**, 5, pp. 336–337, 1 fig., 1961.

At Inst. Agric., Univ. Minn., St. Paul, max. mutation was obtained by exposing microconidia about 200 at a time to 10 mc. of polonium-210 in a Petri dish so that 90–95% of them were killed. In comparison with the parent culture 10 of the mutants caused inoculated maize seedlings to be shorter, none taller, while a more severe root rot was induced by 8. Pathogenicity of this fungus appears to be influenced by several factors, any of which can be changed by α particles.

Craig (J.) & Hooker (A. L.). **Relation of sugar trends and pith density to Diplodia stalk rot in dent Corn. Diplodia root and stalk rot of dent Corn.**—*Phytopathology*, **51**, 6, pp. 376–382, 4 graphs; pp. 382–385, 7 fig., 1961.

At Univ. Ill., Urbana, inoculations of 12 inbred lines and analyses of samples from corresponding uninoculated plants indicated an association of increased sucrose,

reducing sugar, and total sugar, and high pith density with resistance to *D. zeae* [*D. maydis*: cf. **37**, 407, 717]. It is suggested that senescence of pith tissue, indicated by reduced density, is caused by a decrease in the sugar level of the stem, and that such senescent plants are susceptible. The reasons for differential sugar trends in maize vars. need further investigation, but a possible incompatibility between max. stalk rot resistance and max. yield is indicated.

The 2nd paper describes the greenhouse inoculation of 8-week-old maize plants by infesting the soil under the plants with culture suspensions of *D. maydis* poured through glass tubes. Under these conditions, more severe than in the field, infection began in the roots, passing thence into the stem. Many cortical cells in the roots developed cellular ingrowths or browning and deposition of granular material. Vessels of infected roots and stalks were occluded with lignin-like substances, the most damaging aspect of invasion. Infected nodes were dark brown, with cellular ingrowths. Dead parenchymatous cells of the internodes showed no response to invasion but both these and the discoloured tissues yielded cultures of the pathogen.

KIMURA (I.) & FUKUSHI (T.). **Studies on the Rice-dwarf virus.** —*Ann. phytopath. Soc. Japan*, **25**, 3, pp. 131–135, 1 fig., 1960. [Jap. Abs. from Engl. summ.]

In further studies [cf. **40**, 301] at the Fac. Agric., Hokkaido Univ., rice dwarf virus was mechanically transmitted to the vector *Nephotettix cincticeps* from viruliferous insects and infected rice leaves by glass capillary injection. Virus conc. in the insects appeared to be somewhat higher than in the leaves, and was approx. the same in the viruliferous leafhopper as in the eggs. The virus survived for 48 hr. in extracted leafhopper fluids stored at 0–4° C.; infectivity was maintained for up to 1 yr. when the insects and infected leaves were frozen and stored at —30 to —35° C. The thermal inactivation point was 40 -45° when leafhopper extract was heated for 10 min. in small glass tubes in hot water.

MISAWA (T.) & KATŌ (S.). **On the influence of RNA upon sclerotium formation by the stem rot fungus of Rice.**—*Ann. phytopath. Soc. Japan*, **25**, 2, pp. 75 -79, 5 graphs, 1960. [Jap. Abs. from Engl. summ.]

At the Fac. Agric., Tōhoku Univ., Sendai, Japan, isolates of *Leptosphaeria salvinii* [**37**, 719] cultured for a long time lost the ability to produce sclerotia, but regained it when leaf, leaf sheath, and stem decoctions of rice were added to the culture media. The revival of sclerotial production may be due to substances present in the rice plant, and evidence is presented to show that one of the reasons for the loss of this ability on artificial media may be the disruption of the RNA metabolism.

BARKSDALE (T. H.) & ASAI (G. N.). **Diurnal spore release of Piricularia oryzae from Rice leaves.**—*Phytopathology*, **51**, 5, pp. 313–317, 1 fig., 2 graphs, 1961. [17 ref.]

These further studies at Fort Detrick, Frederick, Md [cf. **37**, 352; **40**, 167], were made in a greenhouse or in a plant growth room on spray-inoculated plants of the vars. Colusa, LaCrosse, C.I. 8970, or Arkrose. An attached leaf was threaded under the lid of a Petri dish and spores from a lesion allowed to fall on a water agar surface in a smaller dish placed inside on moist filter paper. At 100% R.H. and 70–80° F. conidia were released only at night; lesions kept continually in a high R.H. produced up to several hundred times as many spores as those allowed to dry by day. A clockwork apparatus (fully described) showed that spore release from lesions kept moist began soon after dark, reached a max. in a few hr., and then slowly decreased, ceasing at dawn. Under artificial dew periods of less than 24 hr. spore release began 6–8 hr. after the start of the period, stopping soon after dawn. The spore release mechanism in *P. oryzae* has not yet, apparently, been described.

Seki (S.) & Hirata (K.). **Observations on the development and behaviour of the 3 cells in the conidia of Piricularia oryzae Cav.**—*Ann. phytopath. Soc. Japan*, **25**, 3, pp. 136–141, 6 fig., 1960. [Jap. Abs. from Engl. summ.]

A detailed account of morphological phenomena from the Fac. Agric., Niigata Univ.

Togashi (K.), Ogasawara (N.), & Tamari (K.). **Biochemical studies on the blast disease of the Rice plant. Part XVII. Influence of piricularin, a toxic substance of the blast fungus, on the resistance of the Rice plant to the blast disease. (1).** —*Ann. phytopath. Soc. Japan*, **25**, 3, pp. 142–148, 9 fig., 1960. [Jap. Abs. from Engl. summ.]

Studies by sheath inoculation at the Fac. Agric., Niigata Univ. [cf. **35**, 712], showed that treatment of rice plants with piricularin solution (1–2 μg./ml.) increased resistance to *Piricularia oryzae*. Callus formation by the host cell against hyphal penetration was activated and invasion checked. Hyphae were scarcely able to develop in the host cell, even after penetration, and infected cells could not be plasmolysed at the initial stage of infection. No differences were observed between similarly treated plants and controls when both had previously been killed by steaming for 30 min. As piricularin is thermostable, it appears that resistance in the plants treated with it was due to the activated function of the host cell, and not to the antifungal activity of piricularin, which inhibits the germination of *P. oryzae* conidia even at 0·5 μg. ml. This was further confirmed by treatment with 10 μg. ml. piricularin, which reduced the resistance of the host cell to hyphal invasion and upset the functioning of the cell.

Kurosaki (Y.). **Über die Beziehung zwischen der Fleckengrösseverteilung und der Widerstandsfähigkeit von Reispflanzen gegen Piricularia oryzae Cav. (Teil I).** [On the correlation between the size distribution of spots and potential resistance to *P. oryzae* in Rice plants (Part I).]—*Ann. phytopath. Soc. Japan*, **25**, 4, pp. 167–171, 12 graphs, 1960. [Jap. Abs. from Germ. summ.]

At Dōshisha Kōri Coll., Osaka, and Kyoto Univ. estimation of size distribution of the spots on rice infected by *P. oryzae* showed it to be abnormal, with a specific bias as with infection by *Helminthosporium oryzae* [*Cochliobolus miyabeanus*]. Most of the lesions on susceptible tissue are small and punctate, but a few are large and aggressive, whereas on resistant tissue all are small. Hyphae develop freely in culture and the size distribution of colonies is normal. On living leaves, however, the growth curve of the spots is asymptotic. It is thought that the size of the spots can be taken as an indication of the duration of growth of the fungus and of the extent of the resistance capacity of the host tissue.

Toyoda (S.) & Suzuki (N.). **Histochemical studies on Rice blast lesions caused by Piricularia oryzae Cav. IV. Changes in the activity of oxidases in infected tissue.** —*Ann. phytopath. Soc. Japan*, **25**, 4, pp. 172–177, 1960. [Jap. summ. 14 ref.]

In further studies at the Nat. Inst. agric. Sci., Nishigahara, Tokyo [cf. **37**, 718], it was found that in rice leaf tissue round the infected area peroxidase activity increased up to 3 times and that of catalase decreased to $\frac{1}{4}$. Polyphenol oxidase activity was entirely absent and because of this peroxidase must play a major role in the oxidation of polyphenols in association with the rise of the H_2O_2 level in the tissue; since glycolic acid oxidase activity decreases it is thought to be of minor importance in the rise of this level. Ascorbic acid, usually present in leaves in high concs., is expected to reduce the oxidation product of the polyphenols, but ascorbic acid oxidase activity in the infected leaf increases slightly in a wide area of the tissue round the site of infection, suggesting that most of the ascorbic acid may be oxidized to dehydroascorbic acid, which is then unable to reduce the quinones. It is concluded that the browning of the lesions is due to an increase in polyphenol

content and peroxidase activity in the host tissues, a decrease in catalase activity, and a rise in H_2O_2 level due to the alternation of terminal oxidase from metal proteins to flavoproteins.

Tanaka (H.) & Akai (S.). **On the mechanism of starch accumulation in tissues surrounding lesions on Rice leaves due to Cochliobolus miyabeanus. 2. On the activities of β-amylase and invertase in tissues surrounding spots. 3. The formation of artificial spots and the inhibition of starch decomposition in Rice leaves by various chemical compounds.** —*Ann. phytopath. Soc. Japan*, **25**, 2, pp. 80–84, 2 diag., 1 graph; 3, pp. 156–164, 2 fig., 1 graph, 1960. [Jap. Abs. from Engl. summ.]

Further studies at Kyoto Univ. [**39**, 227] showed that starch content increased and invertase activity was stimulated in leaf tissue surrounding lesions produced by *C. miyabeanus*, while sugar content and β-amylase activity declined. Results seem to indicate that the abnormal starch accumulation is partly due to the local decrease in β-amylase activity. The results of placing drops of solutions of chemical respiratory inhibitors, metal salts, and phenols on the leaves of rice plants kept in the dark, to study the formation of spots in relation to the decline of β-amylase activity in leaf tissue surrounding spots following inoculation with conidia are reported in the 2nd paper. Results showed 3 groups of chemicals: (1) those inducing spots and inhibiting starch translocation in rice leaves, (2) those inducing spots without affecting starch movement, and (3) those having neither effect. All chemicals in group 1 strongly inhibited β-amylase activity, but not so group 2. The results seem to indicate that the substance or substances inhibiting β-amylase activity may be produced by the tissues surrounding the spots on rice leaves or by the pathogen itself.

Oku (H.). **Biochemical studies on Cochliobolus miyabeanus. VI. On the breakdown of disease resistance in Rice by reducing agents.**—*Ann. phytopath. Soc. Japan*, **25**, 2, pp. 92–98, 1 col. pl.(10 fig.), 1960. [Jap. Abs. from Engl. summ.]

In further studies at Takamine Lab., Sankyo Co. Ltd., Tokyo [cf. **40**, 167], resistance to *C. miyabeanus* in leaf sheath cells of rice was considerably decreased by the addition of reducing agents, such as ascorbate or glutathione, to the inoculum. An antifungal substance resembling phytoalexin [cf. below] was produced by the interaction of the cells of the rice plant and the germinating spores of *C. miyabeanus*, but could not be considered the active principle in resistance. At the beginning of hyphal penetration the leaf sheath and neighbouring cells were oxidatively stained with various rH indicators. Where mycelium was in contact with the walls of the inner epidermal leaf sheath cells it was also oxidatively stained a deep colour. Results indicate that resistance to hyphal penetration of rice by *C. miyabeanus* can at least partially be attributed to fungal oxidation products, perhaps quinones, derived from host cells or walls.

Uehara (K.). **On phytoalexin produced as the result of the interaction of the Rice plant and the leaf blight bacteria (Xanthomonas oryzae.)**—*Ann. phytopath. Soc. Japan*, **25**, 3, pp. 149–155, 1960. [Jap. Abs. from Engl. summ.]

In further studies at Hiroshima agric. Coll., Saijo [cf. **39**, 522], pieces of rice leaves were wound inoculated with a distilled water suspension of *X. oryzae* [cf. **40**, 104] and placed in a damp chamber for 24–28 hr. Drops were then taken from the inoculated leaves and centrifuged for 10 min. at 6,000 r.p.m. The supernatants were added to a new suspension of *X. oryzae* the bacterial populations of which were estimated after 24 hr. by the phage technique [**37**, 757]. The multiplication of *X. oryzae* on rice leaves was inhibited by the supernatants and the inhibition was attributed to phytoalexin (PA) produced by the interaction of the host and

parasite [cf. **39**, 169]. The multiplication of *X. oryzae* and conidial germination of *Piricularia oryzae*, compared by the same technique as that used previously [loc. cit.], were inhibited by PA from both infections. The antibiotic action of PA, therefore, seems to be non-specific. The multiplication of *X. oryzae* was also compared by wound inoculation of healthy and of ether-narcotized leaves; multiplication was inhibited in healthy leaves and the results indicate that PA is the inhibiting factor, as it appears to be present in healthy but not in narcotized leaves.

Wakimoto (S.). **Classification of strains of Xanthomonas oryzae on the basis of their susceptibility against bacteriophages.**—*Ann. phytopath. Soc. Japan*, **25**, 4, pp. 193–198, 2 fig., 1960. [19 ref.]

In further studies at the Nat. Inst. agric. Sci., Tokyo, *X. oryzae* bacteriophages [**38**, 301] collected from various places in Japan were classified into 4 strs. (OP_1, OP_{1h}, OP_{1h2}, and OP_2); OP_1 and OP_{1h2} appeared to be the most widely distributed. Classification of 82 *X. oryzae* isolates from rice in different parts of Japan according to phage susceptibility was: str. A resistant to OP_{1h}, B resistant to OP_1, C resistant to all the phages, D susceptible to OP_{1h2} and OP_2, and E susceptible to OP_2. Str. A was the most widely distributed in Japan, followed by B, D, C, E in descending order; distribution of the strs. was irregular. There appeared to be no correlation between the pathogenicity of the strs. and their phage susceptibility [cf. Logan, **40**, 362].

Suwa (T.). **Single cell culture of Xanthomonas oryzae (Uyeda et Ishiyama) Dowson, the causal organism of bacterial leaf blight of Rice plant.**—*Ann. phytopath. Soc. Japan*, **25**, 4, pp. 199–201, 1960. [Jap. Abs. from Engl. summ.]

At the Nat. Inst. agric. Sci., Tokyo, *X. oryzae* failed to develop colonies when cultured from a single isolated cell inoculated to 'potato ring-rot medium' (peptone 5 g., $NaNO_3$ 1 g., K_2HPO_4 2 g., NaCl 2 g., sucrose 20 g., potato 300 g., and 1,000 ml. water) supplemented by hot water extract of the bacterial cells, rice seedling decoction, vitamin-free casein hydrolysate, or yeast extract, singly or in various combinations [cf. **33**, 113]. Colony formation from a single cell occurred, however, on this medium supplemented with a compost extract and *X. oryzae* culture filtrate.

Halisky (P. M.). **Heritable albinism in Sphacelotheca reiliana.**—*Phytopathology*, **51**, 6, pp. 407–409, 4 fig., 1961.

Further studies at Univ. Calif., Davis [**40**, 607], showed that the 'buff' or 'albino' mutant of *S. reiliana* was strongly pathogenic to sorghum, sorgo, and Sudan grass vars. and that this albinism is a heritable character governed by homozygous factors. Systemic infection, sporulation on the foliage, and soil-borne infection, as occur with this smut in its normal state [loc. cit.], were also features of the mutant.

Hsi (C. H.). **An effective technique for screening Sorghum for resistance to charcoal rot.**—*Phytopathology*, **51**, 5, pp. 340–341, 1961.

At the Plains Substa., N. Mex. agric. Exp. Sta., Clovis, plants were tested against *Macrophomina phaseoli* [cf. **25**, 109; **36**, 242] in infested field soil in the greenhouse under extreme heat (20–30° F. higher than outside) and under moisture stress during the fruiting period, 1 of the 2/hill also being toothpick-inoculated.

Dalela (G. G.). **Influence of pH on the germination of uredo- and aecidiospores of Puccinia penniseti Zimm.**—*Sci. & Cult.*, **27**, 4, p. 196, 1961.

The opt. range for uredospore and aecidiospore germination of the rust from *Pennisetum typhoides* was determined at Bot. Dept, Accra Coll., Ghana, as pH 6·6–8·4 at 14–15° C.

GRANT (T. J.), MOREIRA (S.), & SALIBE (A. A.). **Citrus variety reaction to tristeza virus in Brazil when used in various rootstocks and scion combinations.**—*Plant Dis. Reptr*, **45**, 6, pp. 416–421, 1961.

This report lists the growth responses of citrus var. scions on tristeza-tolerant rootstocks, and the rootstock vars. found susceptible, rootstock-scion combinations having been tested co-operatively by the Inst. agronómico, Campinas, Brazil, and the U.S. Dept Agric., Orlando, Fla [cf. **40**, 304].

MARTIN (J. P.), HARDING (R. B.), & GARBER (M. J.). **Relation of soil properties and plant composition to growth of Citrus seedlings in 100 non-fumigated and fumigated old Citrus soils.**—*Soil Sci.*, **91**, 5, pp. 317–323, 1961. [24 ref.]

At Univ. Calif. Citrus Exp. Sta., Riverside, *Phytophthora* spp. [cf. **39**, 310] were recovered from 40 of 100 soils from mature citrus orchards representing the major citrus-producing areas of Calif. Poor growth of citrus in fumigated soils, varying greatly according to the type of soil, was not correlated with the presence of *P.* spp., but rather with the presence (though not the number) of nematodes. In non-fumigated soils *P.* and nematode populations were retarded at a soil pH < 5–5·5.

FISHER (FRANCENIA E.). **Greasy spot and tar spot of Citrus in Florida.**—*Phytopathology*, **51**, 5, pp. 297–303, 7 fig., 1961. [30 ref.]

At Univ. Fla Citrus Exp. Sta., Lake Alfred, citrus greasy spot [**37**, 84; **40**, 306 *et passim*] and tar spot were shown to be caused by 2 new spp., *Cercospora citri-grisea* Fisher, conidia 1·5–3 × 25–200 μ, and *C. gigantea* Fisher (6–8 × 80–180 μ), respectively. Greasy spot generally affects the leaves, occasionally twigs, and is more prevalent on grapefruit and lemon than on orange, and on younger than on older trees. It has recently become more serious in Fla, causing defoliation, sometimes up to 95%. Oil emulsion, Cu, or zineb applied from mid-June to early Aug. give control [loc. cit.].

Tar spot somewhat resembles greasy spot, but affects fruits as well as leaves and can kill seedlings. Though not at present widespread in Fla it is potentially serious. A mahogany-red circle inside the periphery of the spot, visible with transmitted light, distinguishes it from greasy spot; the leaf yellowing typical of the latter does not occur. Fungicidal control was not attempted, but leaves and fruits appear to have separate infective periods.

DURAN (R.) & NORMAN (SHIRLEY M.). **Differential sensitivity to biphenyl among strains of Penicillium digitatum Sacc.**—*Plant Dis. Reptr*, **45**, 6, pp. 475–480, 4 fig., 1961.

Great differences in biphenyl sensitivity among strs. of *P. digitatum* [cf. **38**, 743 and below] were found at the Market Quality Res. Div., Pomona, Calif. The sensitive ones germinated in a biphenyl atmosphere as readily as the others, but were unable to develop beyond the germ tube stage in a continuous atmosphere of this nature, and when inoculated into lemons were readily controlled with biphenyl. Under the same conditions spores of non-sensitive strs. developed vigorous sporelings, rich post-germination growth, and were not controlled. Ability to grow well under biphenyl was more important than spore germination counts in detecting tolerant strs. Non-sensitive strs. were found in 5 citrus areas in S. Calif.

HARDING (P. R.) & SAVAGE (D. C.). **Biphenyl-resistant strains of Citrus green mold.**—*Calif. Citrogr.*, **46**, 9, pp. 280, 306–308, 1 fig., 1961.

It is reported from the Res. and Development Dept, Sunkist Growers, that strs. of *Penicillium digitatum* resistant to biphenyl [see above] are not necessarily those which have been exposed to it. In addition to improving sanitation in packing

houses a supplement or substitute for biphenyl that will control biphenyl resistant and sensitive moulds is being sought.

ARENA (MARIA). **Sulla microflora dei frutti di Citrus limonum in Sicilia.** [On the microflora of Lemon fruits in Sicily.]—*Nuovo G. bot. ital.*, **67**, 1–2, pp. 185–189, 1 pl.(6 fig.), 1960.

At Univ. Messina the main spp. isolated in June 1960 from a series of Monachello lemons were: at picking *Cladosporium* sp., *Penicillium cyclopium*, *Gloeosporium* sp., *Alternaria* sp., *Fusarium* sp., *P. citrinum*, *P. frequentans*, *Monilia* sp., and *P. implicatum*; and after 2 or 6 days' storage *Trichoderma koningii* [*T. viride*], *F.* sp., *Aspergillus phoenicis*, and *P. cyclopium*.

COOLHAAS (C.), DE FLUITER (H. J.), & KOENIG (H. P.). **Tropische und subtropische Weltwirtschaftspflanzen. III. Teil: Genusspflanzen, 2. Band Kaffee. Zweite neu bearbeitete Auflage.** [Tropical and subtropical economic plants of the world. Part 3: Food plants. vol. 2. Coffee.]—Second revised edition, viii+ 315 pp., 66 illus., Stuttgart, Ferdinand Enke, 1960.

This comprehensive reference book contains a sub-chapt. (pp. 98–128) on diseases caused by viruses (3 only) and fungi (arranged according to the part of the plant attacked). The account of each pathogen includes synonyms, local names, symptoms, other hosts, distribution and control, both preventative and curative. The bibliography (pp. 177–182) contains many items relating to coffee diseases.

Twelfth Annual Report of the Research Department of the Coffee Board (1958–59).—*Bull. Indian Coff. Bd Res. Dep.* 12, 183 pp., [? 1960].

Some of the information in this report has been noticed. In the mycology sect. (pp. 94–113) [cf. **39**, 411] K. V. GEORGE reports that by further studies of brown eyespot disease in S. India *Cercospora coffeicola* and *C. coffea* have been tentatively identified as the causative agents.

Frequent application of Bordeaux mixture alone or in combination with fertilizers seemed to be correlated with a high incidence of 'kondlie' disease [**39**, 579] though major and minor elements by themselves did not appear to have any effect.

In inoculation trials with *Myrothecium advena*, the agent of target leaf spot [**38**, 598], only Arabian coffee became infected. The disease is noticed only when the atmospheric humidity is high. The cause of a new leaf spot of Arabian coffee recorded recently has been identified as *Sarcopodium* sp.

BURDEKIN (D. A.). **The effect of captan and copper sprays on leaf rust and leaf fall of Coffee.**—*Rep. Coffee Res. Sta. Lyamungu, 1960*, pp. 56–59, 3 graphs, 1961.

Experiments in Kenya having indicated that captan may give good control of coffee leaf rust (*Hemileia vastatrix*) [**39**, 412], though early trials in Tanganyika were less satisfactory, a further test was made at Tengeru, in which coffee was sprayed with captan at 2 concs. each applied according to different schedules, or with 5 lb. of a 50% Cu formulation/100 gal./acre applied every 2 months.

The 1st year's results indicated that captan is best applied at 4½ lb./160 gal./acre, 4 times in Feb.–Mar. The Cu fungicide applications at present recommended for use locally [cf. **39**, 456] gave good leaf retention, but did not control leaf rust well, probably because of heavy rains, and captan used as above gave better results. The investigation continues.

FERNIE (L. M.). **The selection of Arabica Coffee at Lyamungu: I. The 'N' series.**—*Rep. Coffee Res. Sta. Lyamungu, 1960*, pp. 12–17, 1 pl., 1961.

Examination at the Coffee Rust Res. Sta. Centre in Portugal of material from the

'N' series of arabica selections produced at Lyamungu, Tanganyika, showed that this series displays the typical Bourbon reaction to *Hemileia vastatrix* [**39**, 707, *et passim*] and is susceptible to races I and II [**40**, 169, 533]. The use of N. 39 in a limited breeding programme resulted in some hybrids, including N. 39 × VC.496 among others, which exhibited hybrid vigour and high rust-resistance as well as giving good yields, during the 1st 3 bearing yr.

Burdekin (D. A.). **Survey of races of Coffee leaf rust in Northern Tanganyika.**—*Rep. Coffee Res. Sta. Lyamungu, 1960*, pp. 60–61, 1961.

A survey of the races of *Hemileia vastatrix* [cf. **35**, 164 and above] in the Northern, Tanga, and Eastern Provinces indicated that I and II appear to be widespread. The occurrence of race III at Lyamungu is as yet unconfirmed.

Tapley (R. G.). **Crinkle-leaf of Coffee in Tanganyika.**—*Kenya Coffee*, **26**, 305, pp. 156–157, 2 fig., 1961.

Coffee crinkle leaf [cf. **40**, 416] is widespread in the Northern Province of Tanganyika, but in its severest form it is mainly confined to unshaded coffee in sheltered valleys or forest glades on the western slopes of Kilimanjaro; on the same farms unshaded coffee in more exposed situations is only mildly affected. The severe form is also present at Mbozi, in the Southern Highlands Province, and the Matengo Highlands in the Southern Province. Experimental evidence indicated that the disease is not caused by a mite or insect. The condition occurs during the hot, dry season, when the daily range of temp. is at a max.

Jones (J. P.). **A leaf spot of Cotton caused by Corynespora cassiicola.**—*Phytopathology*, **51**, 5, pp. 305–308, 3 fig., 1961.

Reported from the Delta Branch, Miss. agric. Exp. Sta., Stoneville, on cotton in 3 commercial fields, the fungus isolated proved pathogenic to both *Gossypium hirsutum* and *G. barbadense* and appears identical with the pathogen attacking soybean and sesame in the same area [**39**, 710]. It is distinct from, though similar to, *Helminthosporium gossypii*; probably some previous reports of a disease of cotton due to the latter referred in fact to *C. cassiicola* [cf. **14**, 755]. The fungus overwintered on cotton stems in the field.

Perry (D. A.). **Fusarium wilt of Cotton.**—*Progr. Rep. Exp. Stas Emp. Cott. Gr. Corp.* (*Tanganyika Territory, Lake Province*), *1959–60*, pp. 10–12, 1961.

Further surveys of the incidence of *F. oxysporum* [f. *vasinfectum*: **39**, 581] in Lake Province, Tanganyika, showed that the disease has been steadily spreading. Infection was most prevalent on poor, grey, sandy soil and less prevalent on very sandy lake-shore soil and clay. In 1959 examination showed that 0·2% of the cotton seeds from a severely affected area were infected. The fungus was shown to enter seeds, and these, even if they fail to germinate, must be a source of inoculum to healthy plants.

Bÿchenko (A. I.). Бромистый этилен в борьбе с фузариозным вилтом. [Ethylene bromide for the control of *Fusarium* wilt.]—Хлопководство [*Khlopkovodstvo*], **11**, 6, pp. 34–36, 1961.

In 1958 in the Turkmen-Kala region, Turkmen S.S.R., ethylene bromide was introduced manually into 20 cm. drills (500 kg./ha.) for the control of *Fusarium* wilt [*F. oxysporum* f. *vasinfectum*: **40**, 417]. Losses in cotton var. 5476–I were 8·8% as against > 50% in the untreated. At the Marÿ exp. Sta., Turkmen S.S.R., in Apr. 1960 barley inoculum was ploughed into a plot to depths of 15 and 25–30 cm.; 6 weeks later ethylene bromide, pure diesel oil, and a mixture of the 2 were introduced into drills at 20 cm. On 21 May seed of the susceptible 5476–I was sown. Yield with ethylene bromide at 100 and 150 kg./ha. was 3·6 and 4·2 times higher

than without; 40% ethylene bromide with diesel oil gave a 2-fold increase. Ethylene bromide at 500 kg./ha. preserved all the plants, 87·5% of which were healthy.

Mirpulatova (Mme N. S.). Некоторые выводы из исследований по вилту. [Some results from research on wilt.]—Хлопководство [*Khlopkovodstvo*], **11**, 6, pp. 30–33, 1961.

In recent years *Verticillium dahliae* has again been prevalent on cotton in Uzbekistan, especially in the Tashkent, Andijan, Ferghana, and Bukhara regions, owing to lack of crop rotation, prolonged monoculture of var. 108–F, and the systematic ploughing in of infected stalks.

At the Uzbek Inst. Plant Prot. in 1960 a str. forming numerous microsclerotia was converted into a mycelial str. by subculturing mycelium (7 passages). The reverse effect was obtained with another str. Both were thought to be *V. dahliae*, but with different predominant characters. The Bukhara str. (microsclerotial) produced 30% infected plants in pot tests, while the str. forming few microsclerotia was non-pathogenic. Virulence increased after passage through the relatively resistant 108-F, and not through the more susceptible 2034.

The activity of respiratory enzymes of strs. isolated from 108-F from different regions was found to change after passage through a var. with variable resistance.

Green manuring with rye ploughed in in spring depressed *V. dahliae* and reduced virulence, though in many tests on alkaline soils these results were not confirmed.

There was 37·1% infection with 60,000 plants/ha., 26·3% with 60–80,000/ha., 18·3% with 80–100,000 ha., and 9·1% with 100–120,000. Further tests confirmed the importance of crop rotation in depressing *V. dahliae* in the soil, while growing rice gives almost complete soil disinfection.

Urea ground with cotton stalks (200 kg./ha.) gave a 2-fold reduction in the number of infected plants in comparison with stalks alone ploughed in, while yield increased 12%. Urea (1 g. drill) 20 days before sowing was more effective than 6 fungicides, reducing infection to 11% judged by external symptoms (but 33·3% determined by cutting sections) compared with 60 and 89% without urea. Good results were also obtained by spraying at the 3–4 leaf stage with a 1% suspension of Cu trichlorophenolate (500–600 l./ha.), and also with 2% solution of urea + 2% $ZnSO_4$.

Babayan (A. A.). О методике выведения гоммозоустойчивых сортов Хлопчатника. [On methods for breeding Cotton vars. resistant to gummosis.]—Хлопководство [*Khlopkovodstvo*], **11**, 6, pp. 22–27, 1961.

Recent work on developing cotton vars. resistant to [*Xanthomonas malvacearum*] is surveyed. In 1958 seed of a number of resistant vars. developed at the Moldavian Sta. for Plant Prot. were sent for testing at the Armenian sci. Res. Inst. for Grain, Echmiadzin. The immune lines retained were OD-1 nos. 490, 307, 651, 843; 6466-U nos. 708, 702; and 611-B no. 749. In OD-1 60% of the F_2 were resistant compared with 25% in the F_3. OD-1 806 was the most resistance to *Verticillium* wilt [*V. dahliae*: **40**, 107]. Healthy plants selected in the autumn from seed infected by *X. malvacearum* and *V. dahliae* were tested in the following year by repeated inoculation. Max. infection in selected seed was 10·4%, and in the F_4 of OD-1 847 the shoots were healthy. The results of parallel work at other institutes are briefly indicated, and it was established that the retention of immunity differs considerably according to locality. Immunity was best retained in Moldavia, then in the Ukraine and Azerbaijan; it was least in Uzbekistan and Armenia.

Fernandes (V. T.). Испытание сортов Хлопчатника на устойчивость к вилту. [Testing Cotton vars. for wilt resistance.]—Хлопководство [*Khlopkovodstvo*], **11**, 6, pp. 27–30, 2 fig., 1961.

In plot tests at Izbaskent vars. tested for resistance to *Verticillium* wilt [*V. dahliae*:

40, 467 and above] were 32–73% infected. Var. 108-F and new lines 152-F and 153-F were the most resistant, the 1st being medium susceptible and the others mildly so. Yields from these vars. in 1960 were 13·1, 5·4, and 9·6% below that of uninoculated controls.

At the Termez plot, Uzbekistan, and the Marȳ plot, Turkmenia the regional long staple vars. 9123-I and S-6002 were comparatively resistant to *Fusarium* wilt [*F. oxysporum* f. *vasinfectum*: **40**, 417, 468], also the new vars. I-37, S-6022, 9122-I, and 9182-I.

Bulb and corm production.—*Bull. Minist. Agric., Lond.*, 62, 74 pp., 8 pl., 15 fig., 1961. 5*s.* 6*d.*

This up-to-date account includes a section (pp. 59–70) on diseases and pests affecting narcissus, tulip, iris, and gladiolus.

Zummo (N.) & Plakidas (A. G.). **Spread of petal blight of Camellias by air-borne ascospores of Sclerotinia camelliae.**—*Phytopathology*, **51**, 1, p. 69, 1961.

Spraying the ground with fungicides to inhibit apothecial formation by *S. camelliae* [**40**, 472] is not always satisfactory since ascospores may be windborne from neighbouring infected, unsprayed areas. From an isolated property near Hammond, La, ascospores were blown for at least 0·4 mile to potted plants set out at intervals in 2 directions. Incidence was high (37 and 63%) on plants 0·3 mile from the source.

Thomsen (A.). **Termoterapeutiske behandlinger af Nelliker.** [Thermo-therapeutic treatment of Carnations.]—*Horticultura*, **15**, 5, pp. 136–139, 2 fig., 1961. [Engl. summ.]

At the Danish State Plant Path. Inst. carnation ring spot virus [**37**, 480] did not become systemic in plants of *Dianthus barbatus* inoculated and kept at 37° C. for 30 days from 0–8 days after inoculation. When *D. caryophyllus* plants were kept at 37° for long periods the shoots became etiolated. Plants were removed after 4 and 8 weeks respectively for further growth, and in most cases still contained virus. Use of *D. barbatus* and *Chenopodium amaranticolor* as indicator plants suggested the presence of 2 or more viruses, of which only carnation ring spot was eliminated by heat treatment.

Heimann (M.). **Nochmals : Problem 'Erica-Sterben'.** [Again the problem of 'die-off' in *Erica*.]—*Gartenwelt*, **60**, pp. 122–124, 1960. [Abs. in *Z. PflKrankh.*, **68**, 4, p. 226, 1961.]

The author maintains that *Phytophthora cinnamomi* is not the sole agent of this disease [cf. **39**, 415] but that *Pestalozzia* [*Pestalotia*] *versicolor* and *Olpidium brassicae* [**37**, 239] are also involved. Sanitary measures recommended include watering with 0·01–0·025% quinosol.

Morrison (R. M.). **The culture of Erysiphe cichoracearum DC. upon detached leaves of Zinnia and Helianthus.**—Abs. in *Proc. Ind. Acad. Sci.*, **69** (*1959*) pp. 108–109, 1960.

Methods of culturing leaf disks of *Zinnia* and *Helianthus* at Univ. Ind. and suitable media and environments for maintaining mildew cultures are discussed. Detached leaves proved best. The factors affecting both perithecial and conidial phases have been investigated [**40**, 662].

Catherall (P. L.) & Griffiths (E.). **Effects of streak virus on the growth of Cocksfoot.**—*Plant Path.*, **10**, 2, pp. 72–77, 1 graph, 1961.

At Univ. Coll. of Wales, Abersystwyth, it was ascertained that cocksfoot streak virus [cf. **39**, 320] usually induces on cocksfoot [*Dactylis glomerata*] a very conspicuous longitudinal streaking of dark and pale green or yellow, most readily visible

in summer and early autumn. Sometimes, however, the mottle is inconspicuous. Affected plants are often pale and 'floppy' and may be picked out at a distance. Marked dwarfing is often present. One striking effect is a reduction in tillering to about 60% of that of healthy plants. The dry-matter yield of diseased plants is, however, reduced only by about 10%. In the absence of K applications the dry-matter yield tiller of healthy plants was 20% less than that of affected ones, whereas in the presence of K it was 54% less.

Studies on single plants showed that the symptoms and effects of the virus are least in conditions of low fertility, particularly low N. It was found that the main effect of K is, at certain times of the year, to increase the dry-matter yield/tiller, and so to offset to some extent the adverse effects of reduced tillering. In mixed (artificial) swards kept closely cut the extra growth of healthy plants compensated almost entirely for the reduced growth of affected ones. The practical significance of the disease is likely to be least in well-grazed swards and greatest in fields put up for hay. Affected *D. glomerata* plants may be expected to disappear from a sward; in swards substantially infected, patchy growth with resultant reduced production might occur during the following spring.

Slykhuis (J. T.). **Differential hosts and new host records for five grass viruses.**—*Canad. J. Pl. Sci.*, **41**, 1, pp. 211–216, 1961. [20 ref.]

At the Central exp. Farm, Ottawa, Ont., *Lolium multiflorum* was susceptible to *Agropyron* mosaic virus (AMV) [**40**, 689], wheat streak mosaic virus (WSMV) [cf. **39**, 224], barley stripe mosaic virus (BSMV) [cf. **40**, 164], ryegrass mosaic virus (RMV) [cf. **38**, 736], and orchard grass mosaic virus (OMV) [cf. **36**, 191]. Four wheat vars. were susceptible to AMV, WSMV, and BSMV, Clintland oats to WSMV, RMV, and OMV, *L. perenne* and *Dactylis glomerata* to RMV and OMV, *A. repens* to AMV, and *Setaria italica* to BSMV. Brant and Husky barley were slightly susceptible to AMV, but 7 other barleys appeared immune. It is suggested that *A. repens*, Clintland oats, *L. perenne*, and *S. italica* would serve as differential hosts to distinguish the above 5 viruses.

Bancroft (J. B.), Tuite (J. F.), & Hissong (G.). **A virus from White Clover in Indiana.**—Abs. in *Proc. Ind. Acad. Sci.*, **69** (*1959*), p. 108, 1960.

The host range of the mechanically transmissible virus from white clover in Indiana [**40**, 173, 367] includes 26 spp. in the Convolvulaceae, Cucurbitaceae, Leguminosae, Solanaceae, and Tropaeolaceae. The dilution end-point is approx. 1:105; thermal inactivation 65–75° C., and longevity in vitro < 2 weeks. The av. size of the flexuous rods is 477×15 mμ. The virus is soluble and infective at pH 5.

Pielka (J.). **Wirus czarciej miotły Jabloni. (Proliferacja.)** [Apple witches' broom (proliferation) virus.]—*Zesz. nauk. wyższ. Szkoł. roln. Kraków*, **7**, 10, pp. 199–208, 1960. [Engl., Russ. summ. Abs. in *Referat. Zh. Biol.*, *1961*, 6, Sect. G, p. 79, 1961.]

The occurrence in 1957–8 of this disease [cf. **40**, 271] on Boskop and Boïken apple is reported from the Cracow district, Poland. Symptoms are described and the mode of spread is discussed.

Hirst (J. M.) & Stedman (O. J.). **The epidemiology of Apple scab (Venturia inaequalis (Cke.) Wint.). I. Frequency of airborne spores in orchards.**—*Ann. appl. Biol.*, **49**, 2, pp. 290–305, 7 graphs, 1961.

In aerobiological researches begun in Bramley's Seedling orchards at Wisbech, Cambs., in 1953 [cf. **37**, 288] the number of ascospores caught by automatic

volumetric spore traps differed widely in 6 orchards in Wisbech (2), Sudbury, E. Malling, Long Ashton, and Evesham in which the air was sampled in some or all of the years 1955–59. The results confirmed earlier work on the phenology of ascospore liberation and emphasized the need to decrease their number.

Whereas conidia were previously trapped for the most part only on wet and windy days and seldom appeared to be air-dispersed, use of Hirst spore traps, better for dry than water-borne conidia, among heavily infected, unsprayed trees caught most conidia about noon on warm, dry days; the highest conc. measured exceeded 1,300/cu. m. of air, but in spring air-borne conidia were rare or lacking. It was concluded that ascospores are the chief cause of 1st infection in orchards lacking overwintering conidial pustules. The occurrence of many ascospores in spring was fully confirmed. Splash-dispersed conidia seem inadequate to explain the frequency with which the disease becomes established in summer once a spray programme has ended, but at this time a few viable air-borne conidia could establish the disease again in a clean orchard.

MOORE (M. H.). **Concentrate spraying of Apple trees. II. Dosage/volume relationships of lime-sulphur in disease control and spray damage.**—*Ann. appl. Biol.*, **49**, 2, pp. 254–266, 1961. [10 ref.]

Further paint-gun experiments with lime-sulphur (LS) at E. Malling Res. Sta. against *Venturia inaequalis* and *Podosphaera leucotricha* [**36**, 596] on apples established that control depends primarily on dosage, and not merely on the vol. of spray applied. For small trees the opt. dosage was 2·25–3 gal. acre, but a higher rate (= 7·5 lb. soluble S) would be more reliable with mechanical spraying and in epidemics. Established trees of medium size probably require at least 4–5 gal. LS/acre to ensure control, i.e. 10–12·5 lb. S. This is the equivalent of 200–250 gal./acre of 2% LS or of 300 gal. at 1·5%. These rates may cause leaf scorch, but if LS is used at 1% or less it may give inadequate control of scab, mildew, or red spider. In such circumstances, the degree of control obtained depends on whether the main scab-infection periods, arising from ascospores, occur before or after reduction to 1%. Pre- and post-blossom application of LS as a concentrate, at 100–25%, but especially at 100%, would obviate this difficulty without entailing any risk of severe damage.

Increases in spray vol. caused leaf scorch when the droplets merged into a film and dried more slowly. This point was reached at 24 gal./acre for a 1 in 8 dilution (12½% LS), but about double this vol. would probably be required to give similar cover on trees of more general commercial size. However, around 50 gal./acre of 12½% or even 10% LS is much too phytotoxic to be practicable. Opt. dosage is least harmful at small vols. but medium vol. sprays would be safer with the conc. and dosage reduced to one-half or less. Gravity flow and droplet size increased with increasing dilution of lime-sulphur, influencing distributions on the foliage.

The crop from trees on which scab, mildew, and red spider were not well controlled showed increased fruit russeting, probably resulting from reduced protection against adverse weather by the impaired foliage.

SCHICKE (P.). **Dodine (n-dodecyl-guanidinacetat), ein organisches Schorffungizid mit kurativer Wirkung.** [Dodine (n-dodecyl-guanidinacetate), an organic scab fungicide with curative effect.]—*Z. PflKrankh.*, **68**, 5, pp. 283–293, 1961. [Engl. summ. 23 ref.]

This comparative review of German and American experiments from C. H. Boehringer Sohn, Ingelheim, Rhein, indicates that dodine [**39**, 594] at 0·075–0·05% gives good protection against *Venturia inaequalis* on apple, and at 0·075–0·15% has a curative effect. It partially suppresses *Podosphaera leucotricha*, and also controls pear scab (*V. pirina*).

McCain (A. H.) & Rosenberg (D. Y.). **Pear-Juniper rust, a disease new to California and the United States.**—*Bull. Calif. Dep. Agric.*, **50**, 1, pp. 13–19, 3 fig. (2 col.), 1961. [28 ref.]

Information on *Gymnosporangium fuscum* is recapitulated, with descriptions of the symptoms, host range, disease cycle, and control. The rust was found in 1961 on *Juniperus chinensis* var. *pfitzeriana* and *J. sabina* var. *tamariscifolia* near Lafayette in a mixed planting in which a pear tree had been heavily infected the previous autumn [**40**, 479].

Scurti (Jole C.). **Sulla fruttificazione in coltura dello Stereum purpureum Pers.** [On the fructification in culture of *S. purpureum*.]—*Nuovo G. bot. ital.*, **67**, 1–2, pp. 293–296, 1960.

At the Laboratorio Sperimentale di Fitopatologia, Turin, pieces of trunks and branches of peach [**39**, 236] partly buried in soil in jars were watered at intervals. Typical carpophores of *S. purpureum* developed in 2 jars. Pieces of wood from the roots of peach affected by silver leaf disease but from which no fungus could be isolated by this method were transferred to wetted, autoclaved sawdust in glass containers; after 6 months fruit bodies of *S. purpureum* formed on the top of the wood.

Tapio (Eeva). **Vadelman virustaudit.** [Virus diseases on Raspberry.]—*Valt. Maatalousk. Julk.* 184, 21 pp., 13 fig., 1961. [Engl. summ. 43 ref.]

Preussen and Asker raspberries are the most widely cultivated in Finland, and also Malling Promise in the south. Nearly all vars. grown are heavily infected by viruses, but the Finnish var. Rikala seems to be healthy. The vectors of raspberry viruses are common in Finland, *Amphorophora rubi* and *Aphis idaei* occurring throughout and *Macropsis fuscula* in the southern and central parts. The following virus diseases are recognized by Dept Plant Path., Tikkurila, as the most common: raspberry [moderate] vein chlorosis, raspberry veinbanding, raspberry [mild] yellows, and raspberry mosaic [black raspberry necrosis virus+*Rubus* yellow net virus]. So far raspberry [alpha] leaf curl and *Rubus* stunt have not been noticed. Asker, normally considered resistant to virus diseases, shows symptoms of vein chlorosis.

Stace-Smith (R.). **Studies on Rubus virus diseases in British Columbia. VII. Raspberry vein chlorosis.**—*Canad. J. Bot.*, **39**, 3, pp. 559–565, 1 pl.(4 fig.), 1961.

In further studies at Vancouver [cf. **39**, 724], raspberry [moderate] vein chlorosis virus [cf. **38**, 387] was transmitted from Lloyd George raspberries (from 5 localities) by *Aphis idaei* [cf. **38**, 92] to Lloyd George and Washington raspberries, loganberry, and *Fragaria vesca*. In each, the characteristic symptom was a net-like chlorosis of the tissue adjoining the smaller veins of the leaf. *Amphorophora rubi* was not a vector. Most individuals of *Aphis idaei* required more than 1 day on the virus source-plant before they became viruliferous; viruliferous aphids feeding on healthy raspberry plants became unable to transmit within 1 day, while those feeding on strawberry or kept in a Petri dish without food retained the virus for more than 1 day.

Pitcher (R. S.) & Jha (A.). **On the distribution and infectivity with Arabis mosaic virus of a dagger nematode.**—*Plant Path.*, **10**, 2, pp. 67–69, 2 plans, 1961.

Detailed surveys in the vicinity of an outbreak of arabis mosaic virus [cf. **40**, 720] in strawberries at Sutton Valence, Kent, and of another at Elham, Kent, showed that in the surrounding pastures and orchards dagger nematodes (*Xiphinema diversicaudatum*) were rare or absent; they were, however, numerous in the

intervening hedges and woodlands. Crops susceptible to the virus should not be planted near hedges or on newly grubbed woodlands.

PERIES (O. S.). **Overwintering of Sphaerotheca humuli on Strawberry plants.**—*Plant Path.*, **10**, 2, pp. 65–66, 1961.

Observations by Hort. Sci. Labs., Univ. Bristol, on 2-yr.-old Coronation, Royal Sovereign, and Cambridge Vigour strawberries at Cheddar, Somerset, in the winter of 1959-60, showed that the mycelium of *S. humuli* [cf. **39**, 604] survived on the green overwintering leaves and produced conidia in the spring, which infected the young leaves.

PAGE (O. T.). **Variation in the Banana-wilt pathogen, Fusarium oxysporum f. cubense.**—*Canad. J. Bot.*, **39**, 3, pp. 545–557, 2 pl.(6 fig.), 6 graphs, 1961. [34 ref.]

At La Lima, Honduras, and the Central Res. Lab., United Fruit Company, Norwood, Mass., examination of some of the cultural criteria used in the differentiation of strs. or variants of the banana wilt organism described in the literature (and listed here) [cf. **40**, 318 *et passim*] did not permit conclusive identification. 'Finger printing' by means of a chromatographic assay of exogenous amino acids, measurements of growth, and the production of fusaric acid by single-spore cultures of different strs. [**38**, 612] confirmed the view that so-called clones, cultivars, vars., and groups overlapped and were inseparable.

Although quantitative differences in ninhydrin-reactive substances were demonstrable chromatographically, they were not sufficiently distinctive to allow separation of the variants. Assay of culture filtrates for fusaric acid proved to be a useful index of culture variation providing levels of chelate metals were not excessive. Mycelial wt. determinations for 254 single-spore cultures from 'inodorant interactant', 'cottony alba', and 'sporodochial' cultures are expressed graphically, and the curve obtained was considered to approximate to a normal population frequency distribution, nor were morphological differences evident. Similarly, fusaric acid production in 88 single-spore 'sporodochial' cultures showed a range inexplicable on grounds of technical error.

To investigate host-pathogen relations a method of isolating a single microconidium from a single tracheary cell was devised. Plugs 1·5 cm. diam. and 5 cm. long from the central part of an axis at 1 m. above ground were halved and pulled apart to expose the helical secondary wall thickenings of tracheary elements. Some helices were removed and examined, others were cultured, and others again were immersed in sterile water to isolate single microconidia. In field plots in a highly infested area wilt was observed 150 days after planting, and after 550 days 50·7% of the plants were infected. No delimited groups of different symptoms were noted among the plants or in many hundreds of affected plants examined over a period of 2 yr. A range in the amount of leaf yellowing and collapse of leaves, as well as a variable number of discoloured vascular bundles became apparent when a diseased shoot was felled, and 549 isolates on rice agar showed a range of cultural characters.

It is considered that the variation encountered was of the same order as that inherent in some 40 members of the former sect. Elegans, now classed as *F. oxysporum* [cf. **21**, 223]. Variation in amino acid patterns produced by single-spore cultures of 9 strs. displayed no special trend [cf. **39**, 278]. Odour was unreliable as a basis for separation of the strs. The reported association of 'inodoratum' and 'odoratum' cultivars with yellowing and non-yellowing disease syndromes was not observed.

CLEIJ (G.). **Beet yellows in Poppy.**—*Euphytica*, **10**, 2, pp. 225–228, 1 fig., 1961. [Dutch summ.]

The opium poppy [cf. **39**, 32] seems susceptible to this virus [cf. **38**, 170], which was

back-transmitted by *Myzus persicae* to beet in which it produced symptoms slightly less pronounced than normal. Infection caused complete failure of seed production in the glasshouse and 22% yield reduction and quality deterioration in a field trial. Retarded aphid transmission makes breeding for resistance unnecessary; damage can be prevented by timely treatment with a systemic insecticide.

Green (R. J.) & Sawada (K.). **Septoria leafspot disease of Mentha spp.**—*Proc. Ind. Acad. Sci.*, **69** (*1959*), pp. 128–130, 1 fig., 1960.

In northern Ind. *M. spicata* and particularly *M. cardiaca* are frequently defoliated by a leafspot disease identified at Purdue Univ. as being caused by *S. menthae* [cf. **13**, 126]. Symptoms include small dark patches on the leaves, which lighten to grey or white with a darker brown or black margin. In the centre of the lesions small, black pycnidia are formed.

Spore germination was almost 100% after 48 hr. at 12–32° C. This is the 1st record of *S. menthae* in the U.S.A.

Maramorosch (K.), Rothkirch (H.), & Castillo (B. S.). **Internal spotting, a new disease of Coconut.**—*F.A.O. Plant Prot. Bull.*, **9**, 3, pp. 37–38, 2 fig., 1960.

A previously unrecorded disorder of coconut is reported from Mindoro Oriental, Philippine Islands. Greyish-dark and yellowish spots 2–3 mm. deep are found on the outer side of the coconut meat after removal of the seed skin. Affected nuts are unsuitable for desiccation, but can be used for copra. The amount of discoloured meat in the nuts varied from 11 to 81%. Certain trees with a high incidence of the condition in 1957 had mostly normal nuts in 1960. Others near them had up to 90% spotted nuts. It seems likely that the spotting is either a physiological disorder or is due to the simultaneous action of a disease agent and certain environmental conditions.

Küthe (K.). **Ein neuer Weg zur Bekämpfung von Vektoren im Kartoffelbau. Einsatz von systemischen Saatgutbehandlungsmitteln.** [A new way of controlling vectors in Potato fields. Use of systemic seed disinfectants.] –*Z. PflKrankh.*, **68**, 4, pp. 209–218, 1 plan, 1961. [Engl. summ.]

Further trials in the Giessen district [cf. **36**, 721] reported from the Pflanzenschutzamt, Frankfurt Main, confirmed the good results of spray applications in previous years. The spread of potato leaf roll virus in the stand was reduced almost to zero in 1959 on var. Lori by spraying with metasystox at 800 ml./ha. on 1 June, followed by early harvest on 10 July. In crops harvested later the infection had doubled. Infection in the untreated plots was 4–5 times greater than on the initial material. Treatment of the tubers with granular disyston [**40**, 573] was also successful; 20 kg./ha. (0·4 g./tuber) should be adequate, applied in the sowing machine or a mounted sowing box. No harmful residues were found in samples of the vars. Erstling, Lori, Maritta, Sieglinde, Leona, and Feldeslohn picked in early July, 1960.

Czyżewicz (Z.) & Dziewońska (Mme M.). **Przydatność niektórych odmian Ziemniaka jako partnerów do krzyżówek w hodowli odpornościowej na wirusy Y i liściozwoju.** [Suitability of some Potato varieties as crossing partners in breeding for resistance to Y and leaf roll viruses.]—*Hod. Rośl. Aklim. Nasien.*, **5**, 2, pp. 155–186, 29 graphs, 1961. [Russ., Engl. summ.]

At the Młochów-Bieliny and Stare Oleśno Stas. Inst. Plant Breeding and Acclimatization, Poland [cf. **38**, 536], resistance to potato virus Y was transmitted to the progeny by the var. Działkowiec (less so by Bałtyk and Wyszoborskie, and negligibly by Katahdin), to leaf roll virus by clone 51, and to both viruses by clone 26747. Shamrock tended to emphasize natural tendencies in the other parent in

their reaction to leaf roll, and Aquila and Flisak in their reaction to both viruses. Kolektyw, Delfin, and the clones 9089 and 26746 scarcely affected the resistance of their progenies, and Giewont, Olsztyńskie, and the clones 11965 and 26748 were poor parents for resistance.

Zabłocki (S.). **Obserwacje nad porażeniem Ziemniaków wirusem smugowatości (Y).** [Observations on the infection of Potato with streak virus (Potato virus Y).]—*Biul. Inst. Hod. Aklim. Rośl., 1959*, 6, pp. 21–27, 1959. [Abs. in *Referat. Zh. Biol., 1961*, 6, Sect. G, p. 78, 1961.]

A virulent form of the disease with new symptoms [described in detail] was noticed on the potato var. Dar. To prevent infection, potatoes should be planted at not less than 100 m. from infected stands. Since potato virus Y often appears in Sept., the 3rd selection should take place late or a supplementary 4th selection should be made. Tests of planting material by planting out buds should be made early and frequently.

Hamann (U.) & Lamprecht (P.). **Eine Serienpresse zur Herstellung von Kartoffelpresssäften für Virusteste.** [A serial press for the production of expressed Potato sap for virus tests.]—*NachrBl. dtsch. PflSchDienst, Berl.*, N.F., **15**, 1, pp. 11–12, 2 fig., 1961.

A description from the Inst. für Pflanzenzüchtung, Gross-Lüsewitz, E. Germany, of a labour-saving hand press developed in connexion with tests for the tobacco vein browning str. of potato virus Y. The crank and spindle are linked over a slide coupling adjustable to the pressure. Complete sterilization of parts in contact with the sap is possible and 1600–2000 samples per day may be taken by 1 worker.

Christensen (M.). **Serologiske prøver for Kartoffelvirus X og Kartoffelvirus S på Kartofler dyrket ved forskellige temperaturer.** [Serological tests of Potato viruses X and S in Potatoes grown at different temperatures.]—*Horticultura*, **15**, 5, pp. 140–143, 1961. [Engl. summ.]

Potato vars. Dianella and Arran Victory, infected with potato virus X and S, respectively, were grown at 6° C. in Apr. and 15–20° in June and sample leaves were examined by the slide agglutination method. Temp. conditions did not influence the serological reaction of virus X, whereas virus S from plants grown below 15° and above 20° gave unreliable results. Therefore testing for virus S in Denmark must be done in July, when temps. fluctuate between 15 and 20°, and it should be confined to leaves from the lower part of the plants.

Wenzl (H.). **Zur Geschichte des Auftretens der Stolbur-Welkekrankheit der Kartoffel in Europa. Zur Analyse der Symptome der Stolbur-Welkekrankheit der Kartoffel.** [On the history of the incidence of stolbur wilt of Potato in Europe. On the analysis of the symptoms of stolbur wilt of Potato.]—*PflSchBer.*, **26**, 5–6, pp. 83–86, 7–8, pp. 97–106, 1961. [Engl. summ.]

This historical review notes that the disease [tomato stolbur virus: **38**, 538] was probably recorded for the 1st time in central Europe in 1909 at Eisgrub, S. Moravia [*Z. landw. VersWes.Öst.*, **14**, pp. 759–805, 1911].

The 2nd paper describes experiments at the Bundesanstalt für Pflanzenschutz, Vienna, in which loss of water from transpiring uprooted haulms caused softening of the tubers connected by uninjured stolons and precocious beginning and early exhaustion of sprouting but did not induce spindle sprout. The symptoms observed and those of stolbur disease are somewhat similar; water loss, however, is not the most important cause of stolbur.

Ullrich (J.). **Die Beurteilung der Resistenz von Kartoffelsorten und Kartoffelzuchtstämmen gegenüber dem Erreger des Kartoffelkrebses (Synchytrium**

endobioticum). [Determination of resistance in Potato varieties and breeding stocks to the causal agent of Potato wart (*S. endobioticum*).]—*Züchter*, **30** (*1960*), 8, pp. 350–351, 1961.

A review from the Inst. für Botanik, Brunswick, Germany, of the history of testing for resistance [cf. **39**, 488; **40**, 322] in the last 40 yr. A note is made of an order issued in the German Federal Republic in 1959 to use for seed only vars. resistant to biotype 1.

Rothacker (D.) & Müller (W. A.). **Arbeiten zur Züchtung krebsresistenter Kartoffeln. II. Untersuchung kultivierter südamerikanischer Kartoffelspecies auf ihr Verhalten gegenüber dem Krebsbiotyp G_1.** [Work on breeding wart-resistant Potatoes. II. Tests of cultivated S. American Potato species for their reaction to the wart biotype G_1.] —*Züchter*, **30** (*1960*), 8, pp. 340–343, 1961.

In field and lab. tests at the Inst. für Pflanzenzüchtung, Gross-Lüsewitz, Germany, using a modified form of Müller's method (Thesis, Univ. Rostock, 1960), 25% of the genotypes of *S[olanum] andigenum-tuberosum* and 13% of the 24-chromosome cultivated spp. were resistant to *Synchytrium endobioticum* biotype G_1 (Giessübel) [cf. above]. These findings are maintained to indicate a discovery of an important gene reservoir.

Hey (A.). **Die Kartoffelkrebsforschung in der Deutschen Demokratischen Republik und ihre praktische Auswertung.** [Potato wart disease research in the German Democratic Republic and its practical application.] —*Acad. tchécosl. Agric.*, **5** (**32**), 6, pp. 59–68, 1959. [Abs. in *Z. PflKrankh.*, **68**, 3, pp. 177–178, 1961.]

The area in Germany affected by the newly discovered, virulent biotypes of potato wart [*Synchytrium endobioticum*: **36**, 781] is greater than was first assumed, but although approx. 100 foci have been registered they are not of economic importance. The differences in reaction between the biotypes D_1, G_1, P_1, K_1, E_1, and R are tabulated. Mira, Argo, and Zeisia are fully resistant and high-yielding; Pinnatisecta, Commersoniana, Acaulia, Demissa, and Tuberosa are resistant to D_1, and G_1.

Mortvedt (J. J.), Fleischfresser (M. H.), Berger (K. C.), & Darling (H. M.). **The relation of soluble manganese to the incidence of common scab in Potatoes.** —*Amer. Potato J.*, **38**, 3, pp. 95–100, 1961.

A more detailed account from Univ. Wis., Madison, of information concerning the incidence of *Streptomyces scabies* already noticed [**40**, 242]. Scab was significantly reduced by the addition of 5 and 10 p.p.m. soluble Mn [cf. **40**, 147] to the tuber forming zone of Chippewa potatoes, and a high conc. of soluble Mn may explain why scab is less prevalent in highly acid soils. In a field experiment $MnSO_4$ row-applied with fertilizer to Red Warba potatoes at 50 and 150 lb./acre at planting time made no significant impression on the yield or scab index. The Mn content of the tuber epidermal tissue was increased, but that of the parenchyma tissue was not affected.

Tabayoyong (F. T.). **Cane diseases and pests and their control 1957–1959.**—*Sug. News*, **37**, 2, pp. 61–67, 2 graphs, 1961.

This report from Victorias Milling Co. Exp. Sta., Philippines, is devoted largely to leaf scorch [*Stagonospora sacchari*: cf. **38**, 99], which was under fairly good control (< 45% in 1958 and < 40% in 1959) owing mainly to the replacement of the highly susceptible sugarcane var. H 37–1933 by resistant vars., and partly to this var. being less affected than in previous yrs. A correlation between leaf scorch and temp. or R.H. was not established. Other diseases, including *inter alia*

yellow spot [*Cercospora kopkei*], ring spot [*Leptosphaeria sacchari*], red rot of midrib [? *Glomerella tucumanensis*], and red spot of leaf sheath [*C. vaginae*] were less important.

PORTSMOUTH (G. B.). **Blister blight disease of Tea.** —*Outlook on Agric.*, **3**, 2, pp. 81–88, 3 fig., 1961. [29 ref.]

The appearance of blister blight (*Exobasidium vexans*) of tea in Ceylon in 1946, its nature, and the subsequent control measures devised for the protection of tea in bearing and recovering from pruning are usefully reviewed. Methods of spraying and dusting with Cu fungicides are outlined, with the results achieved, and the general considerations involved. There is no evidence that continued Cu treatment has a phytotoxic effect on tea.

VISSER (T.), SHANMUGANATHAN (N.), & SABANAYAGAM (J. V.). **The influence of sunshine and rain on Tea blister blight, Exobasidium vexans Massee, in Ceylon.** —*Ann. appl. Biol.*, **49**, 2, pp. 306–315, 8 graphs, 1961. [18 ref.]

At the Tea Res. Inst., Ceylon, it was found that 0·1 in. of rain in a day is sufficient for a high percentage of germination of the spores of *E. vexans* to occur. More rain does not materially increase germination and the spores are killed by a few hr. sunshine, so that continued sunshine permits of a reduction in spraying. A method already noticed [**39**, 346, 735] of using recorded sunshine hr. to decide on the frequency of spraying [**40**, 724] is described in fuller detail.

WANG (S.-C.). **A brief introduction to the literature on diseases of Tobacco in China.** —*Zhibing zhishi, 1958*, 2, pp. 117–121, 1958. [Chin. 69 ref.]

A list is presented of 36 diseases of tobacco occurring in China, with details of their distribution, based on the Chinese and Japanese literature which is reviewed. Most widespread and serious are *Phytophthora* [*parasitica* var.] *nicotianae*, tobacco mosaic virus, *Pseudomonas solanacearum*, and 2 *Colletotrichum* spp., all of which cause heavy annual losses and are described in some detail. Included in the list is tobacco ringspot virus [map 144]. *Phytophthora parasitica* var. *nicotianae* occurs in all tobacco growing areas except the N.E. In Chengtu, Szechwan, it oversummers in fallowed paddy rice and bean fields, and in stagnant water, and in the resting state the mycelium or chlamydospores overwinter on tobacco stalks. Among resistant vars. were Beipei no. 2, Kuchang no. 2, and Yellow Prior. Other lines resistant on the basis of 3 yr. testing at the Shantung Tobacco res. Sta. were Oxford no. 2, 3, and 4, and Fuzi no. 64.

One *Colletotrichum* sp., which is fully described but not named (conidia 10–20 × 4·5–5 μ), has recently caused very serious annual losses in the main tobacco growing areas. It is seed-borne. Another sp., determined as *Colletotrichum* at the Shantung agric. Inst., has been noted in Shantung since 1949. *Pythium debaryanum* was very serious in seedling beds in Szechwan. *Pseudomonas solanacearum* caused the most devastating damage to tobacco in Chekiang, with ca. 50% loss in 1 yr. at Sungyang. *Botrytis cinerea* was another serious pathogen on seedlings.

MOYCHO (W.) & KNYPL (S.). **Tobacco mosaic virus—biology, structure, and biochemistry.** —*Lódź. Towarz. Nauk Wydz.*, **3**, 66, 67 pp., 1960. [Abs. in *Chem. Abs.*, **55**, 12, col. 11531 d, 1961.]

A review with 154 ref.

CORNUET (P.) & SPIRE (D.). **Méthode d'isolement direct de l'acide nucléique infectieux libre chez une plante infectée par le virus de la mosaïque du Tabac.** [A method for the direct extraction of free, infectious nucleic acid from a plant

infected with Tobacco mosaic virus.]—*C.R. Acad. Sci., Paris*, **250**, pp. 1843–1844, 1960.

A description is given of a technique employing vertical electrophoresis on agar, in which the nucleic acid falls directly upon the leaf to be inoculated, and allows the collection of a large part of the free, infectious nucleic acid present in a plant infected with tobacco mosaic virus.

Brants (D. H.). **The influence of meristematic tissue and injuries on the transport of Tobacco mosaic virus in Nicotiana tabacum L. cultivar Samsun.**—*Acta bot. neerl.*, **10**, 2, pp. 113–163, 2 pl., 8 fig., 1961. [55 ref.]

Samsun tobacco was inoculated with TMV [**40**, 383] at the Phytopathol. Lab. 'Willie Commelin Scholten', Baarn, Netherlands, and transport rate in the plant estimated by determining the speed with which virus appeared in uninoculated leaves, as indicated by local lesion tests on *N. glutinosa*. Inoculation of the middle leaf caused the most rapid movement, but removal of the stem tip influenced neither direction nor rate from the point of origin, while removal of axillary buds, or these and the stem tip, increased the rate, injury apparently influencing transport.

Stem wounding exerted an effect only when inflicted 24 hr. previously, simultaneously with, or up to 48 hr. after middle leaf inoculation, which suggests that wounded cells attract virus material. Wounding leaves indicated that virus was transported quickly to the damaged region only when wounding occurred from 48 hr. before to simultaneously with the inoculation. Attraction was optimal 42 hr. after wounding, the effects of which supported conclusions from stem wounding tests.

Elimination of meristem activity without wounding was also attempted, stem tips and axillary buds being powdered with fusarex, which inhibited meristem action. When the middle leaf of such a plant was inoculated limited virus multiplication took place, but no transport out of that leaf. Further tests on callus tissue into which a prepared meristem or stem tip was introduced without provoking injuries showed that this tissue formed rootlets 30 days after grafting and the transport rate suddenly increased compared with controls without meristem or stem tip. That primary meristematic tissue itself attracts virus material could not be proved; the directing action apparently derives from active young tissues formed by primary meristematic tissues, such as leaf primordia, which attract the virus.

Lindner (R. C.), Kirkpatrick (H. C.), & Weeks (T. E.). **Effect of source host on infectivity of Tobacco mosaic virus isolates.**—*Phytopathology*, **51**, 1, pp. 15–16, 1961.

When a standard TMV isolate from tobacco was passed through other hosts and re-purified at the Wash. agric. Exp. Sta., Pullman, the relative infectivity, tested on cucumber, depended upon the source host. Local-lesion hosts generally conferred low infectivity. Of the 8 hosts studied *Physalis floridana* yielded the preparation with greatest infectivity, i.e. ×250 that of the least infective, from Pinto bean (*Phaseolus vulgaris*).

Verma (G. S.) & Varma (J. P.). **Nicotiana plumbaginifolia Viv.: another local lesion test plant for Tobacco mosaic virus.**—*Sci. & Cult.*, **27**, 5, p. 262, 2 fig., 1961.

Contrary to earlier belief [**8**, 532], *N. plumbaginifolia* was found a suitable plant for local lesion tests for TMV when carborundum inoculated [**39**, 44] at Lucknow Univ., India, and has the advantage over *N. glutinosa* of being available all the year as a weed. Young leaves were less susceptible than older ones.

Stouffer (R. F.) & Ross (A. F.). **Effect of temperature on the multiplication of Potato virus X in the presence and absence of Potato virus Y.**—*Phytopathology*, **51**, 1, pp. 5–9, 1 graph, 1961.

An expanded account of inoculation experiments on tobacco already noticed [**39**, 193].

Pawlik (A.). **Zur Frage der Überwinterung von Peronospora tabacina Adam. Beobachtungen über Oosporenkeimung.** [On the overwintering of *P. tabacina*. Observations on oospore germination.]—*Z. PflKrankh.*, **68**, 4, p. 193–197, 6 fig., 1961. [Engl. summ. 17 ref.]

In 1960 oospores of *P. tabacina* [**40**, 63, 561] were first found at the Bundesanstalt für Tabakforschung, Forchheim, Germany, on 20 July in the necrotic parts of old tobacco leaves in close contact with the soil. By covering such leaf tissue with soil oospore formation could be stimulated. Germination was observed in 16 cases when the oospore-containing tissue was kept in water.

Apple (J. L.). **The development of black shank in Tobacco as influenced by host nutrition.**—*Phytopathology*, **50**, 6, pp. 386–389, 4 graphs, 1961. [10 ref.]

In further studies at N. Carol. agric. Exp. Sta. on *Phytophthora parasitica* var. *nicotianae* [cf. **38**, 423] disease indices on inoculated plants in sand cultures in the greenhouse rose at N levels higher than that opt. for growth, and fell at lower levels. High P had little effect, but low P lessened susceptibility; K had little effect either way. Increased incidence was correlated with high external osmotic levels. Day length did not affect the results.

Minev (K.). Агротехнички и хемиски мерки во борбата против Тутуновата пепелница — **Erysiphe cichoracearum DC.** [Agrotechnical and chemical control of Tobacco powdery mildew—*E. cichoracearum*.]—Год. Зборн. земјод.-шум. Фак. Унив. Скопје [*God. Zborn. zemjod.-shum. Fak. Univ. Skopje*], **11** (*1957/8*), pp. 247–257, 1958. [Engl. summ. 17 ref. Received 1961.]

This paper [cf. **38**, 627; **39**, 268] gives results of field trials in Yugoslavia in 1955–6. Excessive soil moisture, especially at flowering, favoured the disease, accounting for more infection in the low-lying parts of the fields. The removal of 3–4 lower leaves, though not necessarily delaying the attack, had some effect if carried out on a large scale, whereas the removal of blossom, stimulating the growth of the green matter, also stimulated the development of mildew. Spraying of leaves and the adjacent soil in July–Aug., and repeatedly within 1–3 weeks, with 0·2 and 0·1% cosan (wettable S) was superior to spraying with 0·3% shirlan and 0·2–0·3% fernide (thiram), reducing, for example, incidence of mildew in one locality in 1955 from 78 (1st estimate) and 80% (2nd) infected plants in the untreated control to 34 and 32 and in 1956 (a dry year) from 50 and 60 to 11 and 16. In glasshouse experiments infected plants sprayed with 0·2 and 0·1% cosan carried only a weakly developed mycelium, in contrast to a medium and strongly developed one on plants sprayed with 0·4 and 0·3% shirlan or 0·3 and 0·2% fernide.

Garber (E. D.). **Wildfire disease of Tobacco.**—*J. Bact.*, **81**, 6, pp. 974–978, 1961. [13 ref.]

The author proposes a biochemical explanation for wild fire resistance in tobacco, based on in vivo and in vitro observations at Dept Bot., Univ. Chicago, Ill. The increasing alkalinity and decreasing numbers of viable cells of *Pseudomonas tabaci* [**38**, 227, 627] in poorly buffered liquid media containing yeast extract or a mixture of amino acids, and the apparent stability of pH and viable cell count in well-buffered medium, suggested an explanation for in vivo observations on multiplication of bacteria at the site of leaf inoculation. Viable count of cells at this point

in susceptible leaves increased rapidly and did not decrease significantly during 14 days, but in leaves of a resistant host the count decreased and viable cells could not be detected at some inoculation sites. The buffering capacity of sap from the leaves of susceptible hosts was greater than that from resistant hosts. Resistance was related to a buffer index < 7 and susceptibility to an index > 7. Resistance was explained on the basis of an alteration in the pH of the intercellular fluid toward alkalinity as a result of the metabolic activity of the bacterial cells at the site of inoculation.

STRONG (M. C.). **Control of bacterial spot and other fruit and foliage diseases of Tomatoes.**—*Quart. Bull. Mich. agric. Exp. Sta.*, **43**, 4, pp. 690–694, 1 fig., 1961.

The results of further spraying trials are presented [cf. **39**, 48]. Combinations of various Cu fungicides alone or with organic compounds tested in Mich. during the last 4 yr. offered the best control of early blight [*Alternaria solani*], *Septoria* [*lycopersici*], *Xanthomonas vesicatoria* (not controlled without Cu) and anthracnose [*Colletotrichum phomoides*].

NAYUDU (M. V.) & WALKER (J. C.). **Tomato leaf composition in relation to bacterial spot.**—*Phytopathology*, **51**, 6, pp. 368–372, 1961.

Further studies at Univ. Wis. [cf. **40**, 565] showed a correlation between the slower development of *Xanthomonas vesicatoria* in older tomato leaves and a decrease in N content; a shift in amino acid balance may be important and was evident also between plants held constantly at opt. temp. for disease development (24° C.) as opposed to alternating warm days (28°) and cold nights (16°). Change of nutrient supply retarded disease development markedly only when the osmotic value of the solution was raised by increasing the levels of KCl, NaCl, or $NaNO_3$; the decrease in disease index was then correlated with reduced growth of the host, high osmotic value of the nutrient, and a lower level of Ca and higher K and Na in the tissue.

PÉREZ (J. E.). **Bacterial scab of Tomato in Puerto Rico.**—*Plant Dis. Reptr*, **45**, 6, p. 481, 1961.

Isolates from scab fruits, fruiting plants, and leaves with brown lesions were identified as *Xanthomonas vesicatoria* [map 269] at the Agric. Exp. Sta., Rio Piedras, Puerto Rico, a 1st record for the island.

SHAW (C. G.) & HARRIS (M. R.). **Important diseases and decays of trees native to Washington.**—*Ext. Bull. St. Coll. Wash.* 540, vii + 35 pp., 1960.

This publication covers diseases, under the hosts in alphabetical order of common names, caused by fungi, bacteria, viruses, and unfavourable environmental factors and their control, and concludes with a key to the fruiting bodies of fungi commonly associated with decay.

CARTER (J. C.). **Illinois trees : their diseases.**—*Circ. Ill. nat. Hist. Surv.* 46, 99 pp., 93 fig., 1961.

This is a 2nd printing, with alterations, of a publication on tree diseases of frequent occurrence in Ill. Information on such matters as types of tree diseases and tree therapy is followed by descriptions of diseases affecting 22 kinds of trees, native and introduced, with notes on control. In conclusion some trees relatively free from disease are listed.

SAKSENA (H. K.) & VAARTAJA (O.). **Taxonomy, morphology, and pathogenicity of Rhizoctonia species from forest nurseries.**—*Canad. J. Bot.*, **39**, 3, pp. 627–647, 2 pl.(16 fig.), 1961. [60 ref.]

From Dept Agric., Ottawa, and Agric. Res. Sta., Saskatoon, Sask., after reviewing

the history of the concept of the genus *Rhizoctonia* and listing 10 spp. (5 new [**40**, 255]) and 1 var. from forest nurseries in Sask. and Man., the authors describe 6 spp. and give the results of pathogenicity studies on all 10. Of the 6 spp. described, 4 (*R. callae*, *R. lilacina*, *R. repens*, and *R. rubiginosa*) are new records for Canada. Comparative morphological studies showed that specific chlamydospore characters were consistent, and their value in diagnosis is stressed.

In pathogenicity tests mycelia of all spp. invaded the tissues of all 9 categories of host seedlings tested, showing no specialization. The spp. were placed in 3 groups: I, causing damping-off, II, in which chlamydospores in the root cells induced various disorders, and III, which penetrated roots symptomlessly. *Corticium praticola* and *R. dichotoma* caused severe damping-off. The former appeared to be by far the most widespread and virulent of all *R.* spp. in nurseries. *R. callae*, *R. endophytica*, *R. globularis*, and *R. repens* formed chlamydospores within the cortical cells of the roots, adversely affecting root development and the general health of the plants. In certain conditions, the endophytes also attacked the aerial parts and caused damping-off.

Krangauz (R. A.). Усыхание Клена остролистного от болезней и меры их предупреждения. [Wilting of sharp-leaved Maple, *Acer sp.*, caused by diseases, and means for preventing them.]—Сборн. Работ. лес. Хоз. всес. н.-и. Инст. Лесовод. Механ. лес. Хоз. [*Sborn. Rabot. les. Khoz. vses. n.-i. Inst. Lesovod. Mekhan. les. Khoz.*], *1960*, 43, pp. 108–133, 1960. [Abs. in *Referat. Zh. Biol.*, *1961*, 4, Sect. G, p. 75, 1961.]

Observations in 1954–56 revealed large-scale wilting in steppe plantations of Forestry Establishments in the Rostov and Stalino regions. *Massaria inquinans* and *Verticillium dahliae* [cf. **38**, 339] were the most widespread pathogens.

Uemura (S.). **Studies on Streptomyces isolated from Alder root nodules (Alnus spp.). Studies on the root nodules of Alders (Alnus spp.). (VI). About the morphological properties of Streptomyces usually isolated from Alder and some other non-leguminous root nodules (Myrica rubra, Elaeagnus umbellata, and Casuarina equisetifolia).**—90 pp., 15 pl., 2 fig., Tokyo, Nōrin Siusan Gijutsu Kaigi Jimu-kyoku. [Secretariat to the Council for Techniques in Agric., Forestry, and Fisheries.] Research Results 7, 1961. [Jap. with Engl. summ.]

In these further studies from the Government Forest Exp. Sta., Meguro [cf. **32**, 405], the 3 *Streptomyces* types (32 strs.) are fully described. Inoculation with fungal and bacterial isolates from alder nodules, either alone or together with the *Streptomyces* isolates, failed to produce nodules. It appears that most of the *Streptomyces* types 1 and 2 are nodule endophytes, though they cannot produce nodules alone; this failure is attributed either to the isolates having lost the ability during isolation and growth in culture or to the necessity for the co-operation of other endophytes, which fail to grow on the usual media.

Ono (K.). **Studies on the Septoria leaf-spot disease of Birch trees. I. Morphological and physiological characters of the fungus.**—*Bull. For. exp. Sta. Meguro* 128, pp. 95–104, 3 pl. (9 fig.), 3 fig., 1961. [Jap. Abs. from Engl. summ.]

Studies at the Hokkaido Branch Lab. for Forest Path., of the morphological characters the fungus indicated it to be very similar to *S. chinensis*. Cultural and physiological studies are also reported. Pathogenicity to 5 birch spp. was shown by inoculation and differences in specific susceptibility of these hosts were noted, *Betula lenta* being relatively resistant. The fungus is probably widespread wherever birch occurs in Japan.

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FUNGICIDES. Information on fungicides is now noticed in *Pesticides Abstracts and News Summary*, Section C, published by Colonial Pesticides Information Service, 56–62, Gray's Inn Rd., London, W.C. 1.

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